18 Apr 78
Revised 25 Sept. 78

BENT CAP ANALYSIS
CAP 18

The CAP 18 Bent Cap Analysis computer program is significantly different from the CAP 17 program which is described in the 1975 “Bent Cap Program User Manual”; but, since CAP 18 includes all the capabilities of CAP 17 plus some additional features, the 1975 manual is still useable. The change required new input forms which have updated input instructions. The differences between CAP 17 and CAP 18 are described below.

A new feature included in CAP 18 is the option to use working stress analysis, load factor analysis, or both analyses. The use of working stress analysis in CAP 18 is essentially the same as for CAP 17. For load factor analysis in CAP 18, the user is able to input actual loads with load factors which are automatically applied to the appropriate loads. CAP 17 required input of the factored loads.

The current version of CAP 18 has a revision date printed on the first line of the computer output. This allows the user at a later time to know which operational version of the program was used for the computations. Any future changes to the program will always be reflected in a change in the revision date.

The following improvements have also been included in CAP 18:

(1) CAP 18 requires two run identification cards for each run and one problem identification card for each problem within the run. CAP 17 required two identification cards for each problem, no run identification cards, and a problem number and card number punched on all data cards.

(2) Options to omit the printing of the Table 4A Dead Load Results or the Table 5 Multi-Lane Loading Summary have been included. CAP 17 allowed only the omission of the Multi-Lane Loading Summary.

(3) The number of cards used for the Table 3 Lists of Stations in CAP 18 is controlled by the number of stringers, supports, moment control points, and shear control points. Only cards containing data are input; no blank cards are now allowed in Table 3. CAP 17 required 14 cards for Table 3, many of which were blank.

(4) The solution process of CAP 18 has been made more efficient and now includes the multiple loading process, the same as in the current BMCOL 51 or SLAB 49 programs.

(5) CAP 18 allows loading at hinges while CAP 17 did not.

(6) The output from CAP 18 appears in decimal form rather than the exponential form used in CAP 17.

(7) Dead load moments and shears have been added to the Table 4A Dead Load Results. It is now unnecessary to add additional control points just to obtain the dead load moments at special locations such as at face of columns.

(8) The Table 6 Envelopes of Maximum Values for CAP 18 now also include minimum values instead of zeros as in CAP 17.

(9) The readability, labeling, and scaling of the plots has been improved in CAP 18.

New input forms with brief instructions have been made for CAP 18. The forms are shown on the following pages. Multiple problems in a problem series may require only changes in Table 1

and Table 4 in which case the second page of the form with Table 3 is omitted. The forms may be used directly or followed as a guide for coding on standard 80 column blank forms.

A five page set of user guide instructions for CAP 18 follows the forms and may be used as an easy reference.

BENT CAP PROGRAM

USER MANUAL

by

Leo K. Willis

BRIDGE DIVISION

TEXAS HIGHWAY DEPARTMENT

January 1975

PREFACE

This manual presents a user-oriented method of analysis particularly suited to highway bridge bent caps utilizing a computer program which has been in use by bridge designers of the Texas Highway Department for nearly eight years. The original work documented in Ref. 1 has detailed information on the solution techniques, but the idealized example problem and instructions have been found difficult to apply to actual bridge bent caps.

Although this manual is written for users unfamiliar with the Bent Cap Program, experienced users will also find it useful. The input instructions are improved over those previously used and include much of the experience benefits gained through extensive use. The various input and output options are presented in greater detail.

The principal portion of the manual consists of example problems, including preliminary calculations of input data, sketches, complete output listings and plots. The output listings and plots are annotated to explain results that have often been misunderstood. These examples are intended as demonstrations of the program and should not necessarily be taken as the best or only way to analyze bent caps.

TABLE OF CONTENTS

THE BENT CAP PROGRAM

Introduction

The Bent Cap Program is a specialized beam-column program modified for use with the AASHTO lane loading rules. The specific version at this time (1974) is designated CAP 17; the number indicating that this is the seventeenth significant revision. When the Bent Cap Program is used for design the following assumptions are built into the solution:

(1) All supports are knife-edged (pin connected).

(2) No axial loads are present.

(3) Live Loadings are varied in accordance with AASHTO rules.

(4) Deck slab for slab and stringer construction is hinged over interior stringers.

The above are consistent with the usual assumptions used when designing bent caps by hand.

Applications

In general, the Bent Cap Program should be used for flexural design of any bent cap. When used with multi-story bents or other bents for which a frame analysis has been run, the bent cap moments may be combined with frame analysis moments by superposition if desired.

Program Features

The program will automatically apply multi-lane loadings as required by AASHTO (within the defined traffic lanes) and determine the resulting maximum shears, moments, dead load deflections and total reactions on the columns. Various input and output data may be stored for re-use in the subsequent problem. Plots of output data may be requested if desired.

Definitions of Terms

Increment - The length of cap represented by one station. The increment length is optional with the user but is usually set equal to 6”. Due to the internal working of the program, a large number of increments will not necessarily insure greater precision. A maximum of 300 increments may be used; however, calculation and print-out time are both increased in proportion to the total number of increments.

Station - The number of increments from the origin.

Origin - Usually the left-most point on either the cap or the deck slab.

Envelope - The set of maximum values for every station generated by each solution of the program. One is generated for maximum positive and negative moment, and one is generated for maximum positive and negative shear. After each computation for a particular station, values are generated at each station

and compared with previous values. The larger is kept and the smaller is discarded.

Random Lane Load - This is the defined movable load, applied to the deck slab, beginning at the “start” station and placed at each designated step across the deck slab without regard to defined boundaries and ending at the “stop” station. A “step” is the number of increments specified on the input form for the movable load increment.

Table 5 - This output table lists all movable load positions used and indicates which controls for each moment or shear control point. Dead loads are separated and listed in this table and are not listed separately anywhere else.

Control Points - Control points are those stations for which maximum shears or moments are desired. These are the only stations for which AASHTO lane load patterns will be used in calculating maximums.

Fixed Load - Dead load or other loads always present.

Movable Load - Live load plus impact or such other loadings as the user desires to have moved about for maximums.

Bending Stiffness - Usually E_cI_g. If the cap is of uniform section the actual value may be arbitrary except that it should be large, say 1,000,000 minimum. If too small, the program may get into solution difficulty, causing erroneous results.

Since kip-feet are used for input then stiffness must be input in kip-feet squared.

Program Calculation Procedures

The Bent Cap Program uses a discrete element model defined by certain input data. Details of the model and associated calculation procedures are given in Ref 1.

Loads may be applied in two different ways. First, they may be placed directly on the cap, such as stringer reactions and the cap dead load. Second, they may be applied thru the roadway slab and automatically distributed to the stringers and thru them into the cap. This distribution assumes the slab hinged at each stringer (except the outside stringers) and will proportion stringer loads accordingly.

When the bent is skewed, the increment length and the weight-per-increment input for the cap are both adjusted automatically for the skewed condition. Stringer stations are not changed when increment length is increased, so that loads placed on the deck slab, including distributed loads, need not be adjusted for skew.

The results of dead (or fixed) loads and live (or movable) loads are not determined as separate envelopes and then combined. Instead a complete solution of all loads is made for each

station and the total kept for the envelope. Fixed load results are tabulated separately from movable loads only in Table 5.

Envelopes of maximums are developed by first calculating an envelope for only the fixed position loads. Then the random lane load is “stepped” across the slab and the cap solved at each step with the results used to expand the fixed-load envelope. Each time a solution is made for a new position of the random load the resulting values at all stations are compared with the previous values and, if any new value is larger, it replaces the previous value in the envelope. After completion of the random lane loading, the traffic lane loading is automatically arranged and values calculated for each pattern used. The results are tabulated in Table 5 along with the random lane load results for each control point designated. A complete solution of the cap is made for each pattern tried and the maximum values at each station are computed and used for further expansion of the envelope if larger; however, only the maximums at the designated control points for each pattern are listed in Table 5.

Input Form

Data is entered on the Bent Cap Program input form; completed copies of which are included with the example problems. The first two lines (cards 01 & 02) are self explanatory and

are to allow the designer to identify the output. This data is listed on the output exactly as it is input.

The third line (Table 1, card 03) allows the user to direct the program to perform several optional operations. The first four blocks allow the user to bold data over from the previous problem, both to avoid unnecessary duplication of input data, and to keep output data for later use. The next three blocks are for entering the total card counts of Tables 2, 3 and 4. The remainder of card 03 is self-explanatory on the form.

The fourth and fifth lines are Table 2 (cards 04 & 05) and are used to describe the geometrical limits of the structure and movable loads.

The sixth thru nineteenth lines are Table 3 (cards 06 thru 19). The sixth line lists numbers of lanes, stringers (beams), supports, moment control points, and shear control points. The computer uses these counts to separate one from the other in the subsequent entries. If the counts are not correct the computer will not interpret the data properly.

Lines seven thru nineteen list the detailed geometric data that physically describe the bent cap, and the locations at which the user wishes maximum values to be calculated (control points).

Lines twenty thru fifty-seven (cards 20 thru 57) are Table 4 and are on the reverse side of the input sheet. These

cards are used to describe the properties of the cap and the locations and magnitudes of the loads. Table 4 is open-ended, i.e., any number of cards may be used; furthermore, it is not required to be in any particular order. Data may be entered in any order convenient to the user.

Data entered in any block of ten spaces should be in exponential form and must be right justified. All other data must be right justified and in integer form.

Table 1 is used to control the input data for the problem. Storage of data from a previous problem is accomplished in Table 1. Placing a 1 in the appropriate block will store the envelopes, Table 2, Table 3 or Table 4. Any or all of these may be held from the previous problem. If storage is not wanted they may either be left blank or marked zero.

The total number of cards in Tables 2, 3 and 4 must be counted and entered in the blocks provided in Table 1. Table 2 must have either no cards (leave blank) or two cards and Table 3 must have either no cards (leave blank) or fourteen cards. When these tables are held from the previous problem the card count is zero and the blocks are left blank. When Table 4 is held from the previous problem new data may be added to it, in which case only the number of added cards is listed in the block for Table 4. Data added to Table 4 will be combined algebraically

with any held data at the same stations. If Table 4 is held and no data is added this block is left blank.

Provision is made in Table 1 to clear the envelopes of results of the random lane loading prior to placing the lane loads in accordance with AASHTO. Placing a 1 in this block will return the envelopes to the fixed load (usually dead load) values. No computation time is saved by exercising this option

Plots of the maximum envelopes of shear and moment may be requested in Table 1. Choice of scale is automatic and is listed on the output.

Provision is also made in Table 1 to suppress the print of Table 5 by entering -1 in the appropriate block. Again no computation time is saved. This option is provided solely to avoid bulky output. When Table 5 is suppressed there is no separate listing of fixed load and movable load results. All results are combined in the envelopes as totals. If Table 5 is desired leave this block blank.

The skew angle, if any, is the last entry in Table 1. The skew angle is zero (normal bent), leave blank. The skew angle must be entered in degrees and decimals of a degree and must be in exponential form ($20^{\circ}30' = 2.050E+01$).

Table 2 defines the increment and the movable load range. The total number of increments used to describe the bent and

roadway slab should be entered in the first block and the increment length which applies to both fixed and movable loads should be entered in the second block.

The next four blocks in Card 04 define the limits of the movable load. The first block is for the width of the movable load in stations. The “start” and “stop” stations are the positions at which the left edge of the movable load is placed and moved in steps across the cap. The step size (shown as movable load increment on the form) is the number of increments used by the program between placements of the movable load. A step size larger than 1 will reduce computation time although the precise placement of the load for some of the control points may be skipped.

Card 05 is provided to enter the multi-lane live load reduction factors. A maximum of five lanes may be applied simultaneously. If only three blocks are filled in, no more than three lanes will be applied simultaneously, etc.

Table 3 defines the lane and stringer geometry and the design control points. In the appropriate blocks in Card 06, the numbers of lanes, stringers or beams, supports, moment control points, and shear control points are entered.

Card 07 defines the left boundary of each lane and Card 08 defines the right boundary of each lane. These lanes may be the

actual lanes or may be arbitrarily defined. As many as ten lanes may be used. Each lane must be at least as wide as the defined width of the movable load in Card 04 of Table 2 unless zero lanes are specified.

Cards 09, 10 and 11 are used to locate the stringers or beams As many as thirty stringers may be used. Stringers are normally input to the nearest whole station; however, if desired they may be input to the nearest tenth of a station. If this is done any fixed loads transmitted thru the stringers must be proportioned to the two adjacent whole stations for input into Table 4. This procedure will be discussed later in Example No. 5. For slab bridges with no stringers, all three stringer cards should be left blank. If no data entry is made on any of these cards “blank card” should be written in the data area. Use script to avoid inadvertent key punching. These blank cards must be included to make the card count equal to fourteen.

Cards 12 and 13 are used to locate the supports (columns). As many as twenty supports may be used and they must be located to the nearest whole station. If Card 13 is not needed for data, “blank card” should be written in the data area as for stringer location.

Cards 14 thru 16 are used to designate moment control points. As many as thirty may be used. Any station entered on these cards

will cause the program to try all combinations of lane loadings, applied thru the deck slab and stringers; calculation of the moments at the control point and every other station; comparison of all the results; and retention of the largest positive and negative values for inclusion in the envelopes. “Blank card” should be written on unneeded cards. Moment control points usually should be specified at each stringer and each support.

Cards 17 thru 19 are for designation of shear control points. The same calculation procedures are used as those for moment control points. As many as thirty may be specified. Due to the internal workings of the program, shear control points should not be specified within two increments of any concentrated loads, i.e., stringers or supports. The station of a shear control point must differ by at least two from any adjacent concentrated load, including supports. When this is violated an error message will print, the calculations will not be made for the illegal control point, and the program will continue. All calculated results will be correct.

Table 4 gives magnitudes and locations of stiffness and loads. Table 4 begins with Card 20 and is unlimited, i.e., any number of cards may be included. These cards may be in any order except that cards in a stiffness or load distribution sequence must be in order.

The first three data blocks are used to locate or give the range of data entered in the succeeding blocks. Giving the initial station in the “From” column and the final station in the “To” column enters uniformly distributed loads and constant stiffness. The “Continued” column is not used.

Concentrated loads are entered by using the same station in the “From” and “To” columns. Both columns must be used.

When either the stiffness or the distributed load vary, they may be entered into Table 4 by interpolation. To do this the initial station is used in the “From” column, the “To” column is left blank and “l” is placed in the “Continued” column. Intermediate stations as desired are listed, in order, on succeeding cards in the “To” column followed by “l” in the “Continued” column. The distribution is ended on the last card by listing the last station in the “To” column and leaving the “Continued” column blank. The intermediate values at each unentered station will be interpolated linearly by the program between the values listed in each entry. Nonlinear data must be approximated by a series of short straight-line segments since the program transitions between varying input values by using linear interpolation.

The three “Fixed-Position Data” blocks should be used in accordance with their headings. Stiffness values for the cap are entered in the first block, sidewalk and/or slab load values

applied to the deck slab should be entered in the second block, and stringer and cap dead load values and any other fixed position loads entered into the third block. All values should be entered in exponential form.

The last data block, “Movable Position Slab Loads” is used to enter movable loads (live loads). The configuration of this loading is optional with the user and is defined by entering the stations as for any other load but with respect to the Number of increments defined in card 04.

The remarks column is not key-punched and is provided for the sole use of the user to note each entry if desired.

Example Problems

Six example problems follow the summary to illustrate the input methods described above. Comments pertaining to each particular design condition are made preceding each example. The output and plots for each example have been marked individually for explanatory purposes.

Limitations and Restrictions

When using the program for various special conditions or unusual situations not covered by the included examples, care should be taken to comply with these rules:

(1) There must be at least two supports.

(2) The cap must be stable.

(3) No cap loads, concentrated or distributed, may be input where the cap is hinged or not defined.

(4) There must be at least two stringers except for slab bridges which must have zero stringers.

(5) The deck slab must be continuous over all defined stringers.

(6) Defined lanes must be at least as wide as the defined movable load. (Unless zero lanes are used).

(7) Defined lanes must not overlap.

Failure to comply with any of the above will terminate all calculation attempts for a problem, i.e., the program will not "run". There are several other errors that can be made without terminating the program. An error message will print defining the error and the program will continue and will give correct results, which may or may not include all the desired results. When input data errors are made in a problem from which calculated data is held into subsequent problems, all problems involving the erroneous data will be terminated. This does not apply, of course, to numerical errors in loads, etc.

The above restrictions may often be avoided by using two or more problems as demonstrated in some of the examples. Any

number of programs may be “stacked” and the envelopes accumulated or expanded so that the last set of envelopes will contain the controlling maximum for each station.

If moment or shear control points are omitted, only the random lane loading is included in the Table 6 envelopes of maximum. The program maximizes results for only those stations specified as control points. Each support is automatically a control point although it will not be listed in the Table 5 Multi-Lane summary unless it has also been input as a moment control point. The Table 6 envelopes include values which are maximum at only the specified control points. The remainder of the stations in Table 6 are probably maximum if the control points have been judiciously selected. They are not individually maximized but are “maximum” only as a result of the adjacent control points being maximized.

When using the bent cap program to design bents for curved, skewed structures the question often arises as to what to use for a skew angle. It is suggested that the skew angle be calculated as the angle whose cosine is the radial distance out-to-out of beams, divided by the distance along the skew out-to-out of beams. Then the radial roadway dimensions may be used as the basis for the “normalized” bent and, more importantly, when the program uses this calculated skew angle the resulting program calculations will be based on the actual bent dimensions. The

radial dimension is available from the superstructure requirements and the skewed distance is available from the frame output data in the geometry program or other calculations.

One capability, which has not been demonstrated, should be mentioned. It is not necessary for the defined traffic lanes to be contiguous, i.e., the movable load may be excluded from medians, gore areas, etc., during multi-lane loading by proper choice of lane boundaries. This will not, by itself, exclude the random lane load. To exclude these effects it will be necessary to either run two problems with the start and stop stations properly arranged, or to exercise the “clear envelopes” option in Table 1, which will remove all effects of the random lane load.

When using two or more increments per step for movable loads the user should make sure that the lane boundaries will permit the stepping to be done without skipping lanes.

Summary

The examples which follow this summary demonstrate the use of the Bent Cap Program for several different design situations covering most of the usually encountered structural arrangements. The bents used for demonstration have all been of concrete construction but the user should be aware that any material can be used.

It is hoped that these examples will provide sufficient insight into the procedures and operation of the Bent Cap Program to demonstrate its uses and versatility. Due to the versatility of the program, there are several ways of accomplishing Bent Cap analysis. The methods shown should be considered as demonstrations and not necessarily as the best or most efficient method for the user's purposes. The user should exercise his own judgement as to program arrangements, etc., for his particular case.

Author

These instructions and examples were prepared by L. K. Willis of The Bridge Division and were reviewed by J. J. Panak of The Bridge Division.

EXAMPLE NO. 1 - A NORMAL BENT (PROBLEM 40001)

The preliminary work needed prior to filling out the input form consists of setting the increment length, assigning stations and calculating the bent cap stiffness and the loads. A typical sheet with a sketch of the bent and showing this work precedes the input form and output which follows. The design conditions for the bent are those for the BGp-C-34HS standard between two 60′ simple prestressed concrete beam spans.

An increment length of 6″ was chosen for this example and the stationing defining the structure laid out. In the interest of symmetry of input data, the station of the midpoint has been set and the remaining stations established symmetrically with respect to the midpoint station. This procedure is recommended when the structure and loads are in fact symmetrical. The results will be symmetrical and will serve as a rough input data check. The ends of the cap were rounded to the whole stations shown.

After calculation of the loads and cap stiffnesses the input form was filled out. Table 1 shows nothing held from the previous problem, 2 cards in Table 2, 14 cards in Table 3, 10 cards in Table 4, retention of the random lane load, request for plots of shear and moment envelopes, inclusion of Table 5 in the output, and zero (blank) skew angle.

With regard to the random lane load a brief discussion of this option seems appropriate. As indicated, the option to use this loading is exercised by leaving the “clear envelopes” option blank. When the random load is used a single movable load (one truck or lane) is placed on the structure independently of the defined traffic lanes and stepped across the cap at the defined movable load increment beginning at the “start” station and ending at the “stop” station, with the results added to the fixed load envelopes. When the effects of this loading are suppressed by entering “l” the results of the random lane load are removed from the envelopes, returning them to the fixed load values although the random lane results still appear in Table 5. The random lane load computations are made in either case; thus no computation time is saved if the random lane results are suppressed.

Table 2, Card 04 shows 74 increments to be used with a length of 0.5 feet to define the bent cap. The movable load will be 20 increments (10 feet) wide with the initial position of the left edge at station 3 (face of rail) and the final position of the left edge at station 51 (10 feet from face of rail). The movable load will be stepped 1 increment between successive solutions of the cap. Table 2, Card 05, shows a

maximum of 3 movable loads for any one solution and the appropriate reduction factors for 1, 2 or 3 lanes per solution.

Table 3, Card 06, shows 3 lanes, 5 stringers, 2 supports, 5 moment control points and 6 shear control points. Card 07 shows the left boundary of each lane and card 08 shows the right boundary of each lane. Card 09 shows the station of each stringer. Cards 10 and 11 are left blank and so marked. Card 12 shows the column locations, and 13 is left blank. Card 14 shows the design control points for moment. (The end stringers are omitted since the cantilever moment will be maximum under the random lane load.) Cards 15 and 16 are blank. Card 17 shows the design control points for shear (must be 2 increments from concentrated loads including supports) chosen for purposes of design. Cards 18 and 19 are blank.

Table 4, cards 20 thru 23, show the cap stiffness and dead load increasing uniformly from station 3 to 14, varying uniformly from station 14 to station 60 and decreasing uniformly from station 60 to station 71. Cards 24 thru 28 show the dead load stringer reactions and card 29 shows the live load plus impact lane reaction per station.

With regard to the live load definition used, the exact arrangement is up to the user. Three alternate patterns are shown on the input data calculations sheet which are of equal total lane load reaction. They have all been shown to indicate

the versatility of the descriptive method and any of the three are acceptable. These particular definitions have been compared by running several identical bents with each definition with the results differing among the three by less than five percent. On this basis, the simple distributed load is suggested for use unless special conditions indicate use of a different definition.

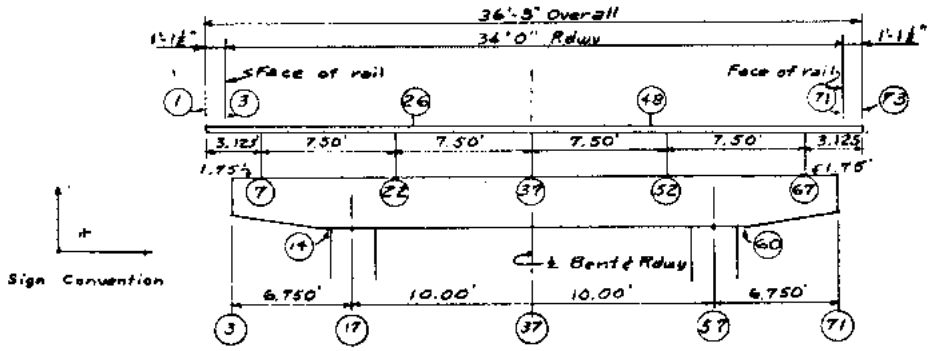
When load factor (ultimate strength) design is desired the input loads should be increased by the proper factors. Group I usually will control cap design for flexure and shear.

File 1284

DESIGN L.K.W. DATE 6-74
CK. DSN. DATE
DESIGN FOR
Example No. 1 – 60' Spans
Normal Bent (BGp-C-34 HS)

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

COUNTY
CONTROL
I.P.E.
HIGHWAY
SHEET OF



Input Calculations For Ex. No. 1

Span lengths = 60'-0" Ea. side
T-2 Rail Ea. Side

Increment length: Use 6" (=5.000 E-01)
No. Inc. = 74

Dead Loads:

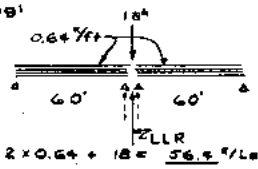
Slab & Diafs = 55.2 x 4.05 = 224^k
Beams = 298.33 x 0.516 = 154
Rail = 0.218 x ½ x 2 x 60 x 2 = 26
Total Super = 404^k

Per Beam: 404/5 = 80.8^k/Beam.
(8.08 E+01)

Live Loads:

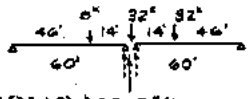
I = 50/(60+125) = 27.0%

Lane loading:



LLR = ½ x 60 x 2 x 0.64 + 18 = 56.4^k/Lane

Truck loading:
(Controls)



LLR = 32 + 46/60 (32+8) = 62.7^k/Lane

(LL+I)R = 1.27 x 62.7 = 79.6^k/Lane

Bent Cap Data:

Stiffness for ends of cap:

$E_c I_g = 3\times10^3 \times \frac{33\times24^3}{12} = 792{,}000$ k-ft²
= 7.920 E+05

Stiffness for interior portion:

$E_c I_g = \left(\frac{36}{24}\right)^3 \times (7.92\text{ E+05}) =$ 2.673 E+06

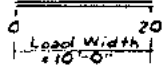
Dead Loads:

End of cap: $w_{DL} = 2.0 \times 2.75 \times 0.150 = 0.825$ ^k/ft
0.825 x ½ = 0.4125 ^k/Inc.
= 4.125 E-01

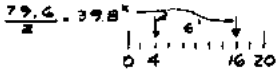
Interior: $w_{DL} = 3.0 \times 2.75 \times 0.150 = 1.2375$ ^k/ft
= 6.188 E-01 ^k/Inc.

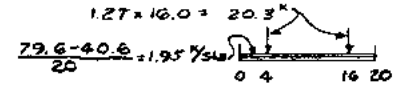
Live Load definition:

79.6/20 = 3.980 E+00



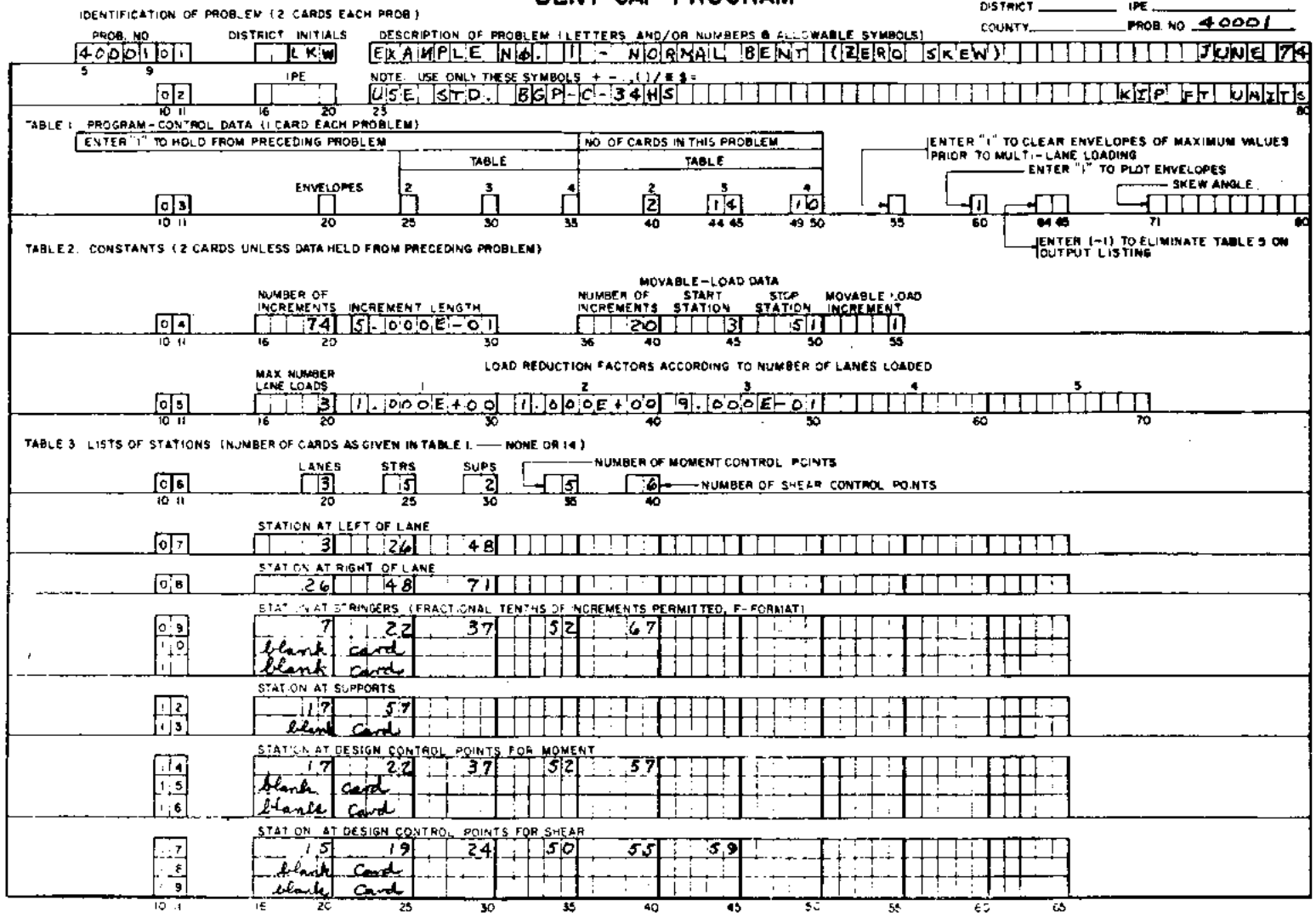
Alternate L.L. Definitions:





TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION
BENT CAP PROGRAM

SHEET 1 OF 1 BY LKW
DATE _____ CONTROL _____
DISTRICT _____ IPE _____
COUNTY _____ PROB. NO 40001



File 5.29-1

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

BENT CAP PROGRAM (CONT'D)

TABLE 4

STIFFNESS AND LOAD DATA (NUMBER OF CARDS AS GIVEN IN TABLE I. ALL DATA ADDED TO STORAGE)

PROBLEM NUMBER		FIXED OR MOVABLE			FIXED-POSITION DATA			MOVABLE POSITION SLAB LOADS	REMARKS
		STATION FROM	STATION TO	CONTINUED (IF=1)	BENDING-STIFFNESS OF CAP	SIDEWALK & SLAB LOADS	STRINGER & CAP LOADS		
40001	20	3		1	7.920E+05		-4.125E-01		Cap. O.L. & Stiffness
	21		14	1	2.673E+06		-6.188E-01		
	22		60	1	2.673E+06		-6.188E-01		
	23		71		7.920E+05		-4.125E-01		
	24	7	7				-8.080E+01		Stringer OL.
	28	22	22						
	26	37	37						
	27	52	52						
	28	67	67						
	29	10	20					-3.980E+00	LL+I.
	30								
	31								
	32								
	33								
	34								
	35								
	36								
	37								
	38								
	39								
	40								
	41								
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	49								
	50								
	51								
	52								
	53								
	54								
	55								
	56								
	57								

5 9 10 11 16 20 25 30 40 50 60 70

File 5.29-2

```
PROGRAM CAP 17 -  DECK THD - MATLOCK,WBI,FE,JJP    REVISION DATE # 12 JUN 68


PROB
40001        LKW  EXAMPLE NO. 1 - NORMAL BENT (ZERO SKEW)            JUNE 74
                  USE STD. BGP-C-34HS                          KIP FT UNITS

TABLE 1 -- PROGRAM-CONTROL DATA
                                                  ENVELOPES    TABLE NUMBER
                                                  OF MAXIMUMS  2    3    4
     OPTIONS TO HOLD (IF=1) FROM PRECEDING PROB         0      0    0    0
     NUMBER OF ADDITIONAL CARDS FOR CURRENT PROB              2   14   10

     OPTION (IF=1) TO CLEAR ENVELOPES BEFORE LANE LOADINGS                0
     OPTION (IF=1) TO PLOT DESIGN VARIABLE ENVELOPES                      1

     OPTION (IF=-1)TO OMIT OUTPUT TABLE 5                                 0

     ANGLE OF SKEW, DEGREES                              0.0

TABLE 2 -- CONSTANTS

     NUMBER OF INCREMENTS FOR SLAB AND CAP                               74
     INCREMENT LENGTH, FT                             5.000E-01
     NUMBER OF INCREMENTS FOR MOVABLE LOAD                               20
     INITIAL POSITION OF MOVABLE-LOAD STA ZERO                            3
     FINAL POSITION OF MOVABLE LOAD STA ZERO                             51
     NUMBER OF INCREMENTS BETWEEN EACH POSITION OF MOVABLE LOAD           1
     MAXIMUM NUMBER OF LANES TO BE LOADED SIMULTANEOUSLY                  3
     LIST OF LOAD COEFFICIENTS CORRESPONDING TO NUMBER OF LANES LOADED
               1          2          3          4          5
          1.000E 00  1.000E 00  9.000E-01

TABLE 3 -- LISTS OF STATIONS

          NUM OF    NUM OF    NUM OF    NUM MOM    NUM SHEAR
          LANES     STRINGERS SUPPORTS  CONTR PTS  CONTR PTS
TOTAL       3         5         2         5          6

                    1     2     3     4     5     6     7     8     9    10

LANE LEFT           3    26    48
LANE RIGHT         26    48    71
STRINGERS         7.0  22.0  37.0  52.0  67.0
SUPPORTS           17    57
MOM CONTR          17    22    37    52    57
SHEAR CONTR        15    19    24    50    55    59
```

```
TABLE 4 -- CAP STIFFNESS, AND DATA FOR BOTH FIXED AND MOVABLE LOADS

FIXED-OR-MOVABLE    - - - - - FIXED-POSITION DATA - - - - -        MOVABLE-
STA    STA    CONTD  CAP BENDING     SIDEWALK,      STRINGER,      POSITION
FROM   TO     IF=1   STIFFNESS       SLAB LOADS     CAP LOADS      SLAB LOADS
                     ( K-FT*FT )      ( K )          ( K )          ( K )

  3           1      7.920E 05       0.0            -4.125E-01      0.0
     14       1      2.673E 06       0.0            -6.188E-01      0.0
     60       1      2.673E 06       0.0            -6.188E-01      0.0
     71       0      7.920E 05       0.0            -4.125E-01      0.0
  7   7       0      0.0             0.0            -8.080E 01      0.0
 22  22       0      0.0             0.0            -8.080E 01      0.0
 37  37       0      0.0             0.0            -8.080E 01      0.0
 52  52       0      0.0             0.0            -8.080E 01      0.0
 67  67       0      0.0             0.0            -8.080E 01      0.0
  0  20       0      0.0             0.0             0.0           -3.980E 00
```

Tables 1 thru 4 list the input data as punched on the cards. This data should be reviewed to assure correct input.

TABLE 4A -- DEAD LOAD DEFLECTIONS

STA	DIST X (FT)	DEFLECTION (FT)
-1	-5.000E-01	0.0
0	0.0	0.0
1	5.000E-01	0.0
2	1.000E 00	-2.723D-03
3	1.500E 00	-2.489D-03
4	2.000E 00	-2.255D-03
5	2.500E 00	-2.021D-03
6	3.000E 00	-1.787D-03
7	3.500E 00	-1.554D-03
8	4.000E 00	-1.320D-03
9	4.500E 00	-1.094D-03
10	5.000E 00	-8.785D-04
11	5.500E 00	-6.794D-04
12	6.000E 00	-4.998D-04
13	6.500E 00	-3.429D-04
14	7.000E 00	-2.114D-04
15	7.500E 00	-1.077D-04
16	8.000E 00	-3.587D-05
17	8.500E 00	0.0
18	9.000E 00	-4.203D-06
19	9.500E 00	-4.225D-05
20	1.000E 01	-1.079D-04
21	1.050E 01	-1.951D-04
22	1.100E 01	-2.975D-04
23	1.150E 01	-4.092D-04
24	1.200E 01	-5.277D-04
25	1.250E 01	-6.509D-04
26	1.300E 01	-7.764D-04
27	1.350E 01	-9.021D-04
28	1.400E 01	-1.026D-03
29	1.450E 01	-1.145D-03
30	1.500E 01	-1.258D-03
31	1.550E 01	-1.363D-03
32	1.600E 01	-1.457D-03
33	1.650E 01	-1.538D-03
34	1.700E 01	-1.605D-03
35	1.750E 01	-1.655D-03
36	1.800E 01	-1.687D-03
37	1.850E 01	-1.698D-03
38	1.900E 01	-1.687D-03
39	1.950E 01	-1.655D-03
40	2.000E 01	-1.605D-03
41	2.050E 01	-1.538D-03
42	2.100E 01	-1.457D-03
43	2.150E 01	-1.363D-03
44	2.200E 01	-1.258D-03
45	2.250E 01	-1.145D-03
46	2.300E 01	-1.026D-03
47	2.350E 01	-9.021D-04
48	2.400E 01	-7.764D-04
49	2.450E 01	-6.509D-04
50	2.500E 01	-5.277D-04
51	2.550E 01	-4.092D-04
52	2.600E 01	-2.975D-04
53	2.650E 01	-1.951D-04
54	2.700E 01	-1.079D-04
55	2.750E 01	-4.225D-05
56	2.800E 01	-4.203D-06
57	2.850E 01	0.0
58	2.900E 01	-3.587D-05
59	2.950E 01	-1.077D-04
60	3.000E 01	-2.114D-04
61	3.050E 01	-3.429D-04
62	3.100E 01	-4.998D-04
63	3.150E 01	-6.794D-04
64	3.200E 01	-8.785D-04
65	3.250E 01	-1.094D-03
66	3.300E 01	-1.320D-03
67	3.350E 01	-1.554D-03
68	3.400E 01	-1.787D-03
69	3.450E 01	-2.021D-03
70	3.500E 01	-2.255D-03
71	3.550E 01	-2.489D-03
72	3.600E 01	-2.723D-03
73	3.650E 01	0.0
74	3.700E 01	0.0
75	3.750E 01	0.0

PROB (CONTD)
40001 LKW EXAMPLE NO. 1 - NORMAL BENT (ZERO SKEW) JUNE 74
USE STD. BGP-C-34MS KIP FT UNITS

TABLE 5 -- MULTI-LANE LOADING SUMMARY (*--CRITICAL NUMBER OF LANE LOADS)

MOMENT (FT-K)

AT STA	DEAD LD EFFECT	LANE ORDER	POSITIVE MAXIMUM	LOAD AT LANE	LOAD AT STA	LANE ORDER	NEGATIVE MAXIMUM	LOAD AT LANE	LOAD AT STA
17	-4.284E 02								
		0	0.0			0	-2.395E 02	1	3
		1	0.0			1	-2.395E 02	1	3
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		0*				0*			
22	-9.837E 01								
		0	1.303E 02	0	19	0	-1.403E 02	1	3
		1	1.045E 02	2	26	1	-1.403E 02	1	3
		2	0.0			2	-1.990E 01	3	51
		3	0.0			3	0.0		
		0*				2*			
37	2.394E 02								
		0	2.985E 02	2	27	0	-7.960E 01	1	3
		1	2.985E 02	2	27	1	-7.960E 01	1	3
		2	0.0			2	-7.960E 01	3	51
		3	0.0			3	0.0		
		0*				2*			
52	-9.837E 01								
		0	1.303E 02	0	35	0	-1.403E 02	3	51
		1	1.045E 02	2	28	1	-1.403E 02	3	51
		2	0.0			2	-1.990E 01	1	3
		3	0.0			3	0.0		
		0*				2*			
57	-4.284E 02								
		0	0.0			0	-2.395E 02	3	51
		1	0.0			1	-2.395E 02	3	51
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		0*				0*			

SHEAR (K)

AT STA	DEAD LD EFFECT	LANE ORDER	POSITIVE MAXIMUM	LOAD AT LANE	LOAD AT STA	LANE ORDER	NEGATIVE MAXIMUM	LOAD AT LANE	LOAD AT STA
15	-8.709E 01								
		0	0.0			0	-4.789E 01	1	3
		1	0.0			1	-4.789E 01	1	3
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		0*				0*			
19	1.323E 02								
		0	5.718E 01	0	14	0	-7.960E 00	3	51
		1	4.763E 01	1	6	1	-7.960E 00	3	51
		2	4.179E 01	2	26	2	0.0		
		3	0.0			3	0.0		
		2*				0*			
24	4.844E 01								
		0	2.733E 01	0	29	0	-7.960E 00	3	51
		1	2.706E 01	2	28	1	-7.960E 00	3	51
		2	8.093E 00	1	3	2	0.0		
		3	0.0			3	0.0		
		2*				0*			
50	-4.844E 01								
		0	7.960E 00	1	3	0	-2.733E 01	0	25
		1	7.960E 00	1	3	1	-2.706E 01	2	26
		2	0.0			2	-8.093E 00	3	51
		3	0.0			3	0.0		
		0*				2*			
55	-1.323E 02								
		0	7.960E 00	1	3	0	-5.718E 01	0	40
		1	7.960E 00	1	3	1	-4.763E 01	3	48
		2	0.0			2	-4.179E 01	2	28
		3	0.0			3	0.0		
		0*				2*			
59	8.709E 01								
		0	4.789E 01	3	51	0	0.0		
		1	4.789E 01	3	51	1	0.0		
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		0*				0*			

REACTION (K)

AT STA	DEAD LD EFFECT	LANE ORDER	POSITIVE MAXIMUM	LOAD AT LANE	LOAD AT STA	LANE ORDER	NEGATIVE MAXIMUM	LOAD AT LANE	LOAD AT STA
17	2.219E 02								
		0	8.756E 01	1	3	0	-7.960E 00	3	51
		1	8.756E 01	1	3	1	-7.960E 00	3	51
		2	4.179E 01	2	26	2	0.0		
		3	0.0			3	0.0		
		2*				0*			
57	2.219E 02								
		0	8.756E 01	3	51	0	-7.960E 00	1	3
		1	8.756E 01	3	51	1	-7.960E 00	1	3
		2	4.179E 01	2	28	2	0.0		
		3	0.0			3	0.0		
		2*				0*			

TABLE 6 -- ENVELOPES OF MAXIMUM VALUES

STA	DIST X (FT)	MAX + MOM (FT-K)	MAX - MOM (FT-K)	MAX + SHEAR (K)	MAX - SHEAR (K)
-1	-5.000E-01	0.0	0.0	0.0	0.0
0	0.0	0.0	0.0	0.0	0.0
1	5.000E-01	0.0	0.0	0.0	0.0
2	1.000E 00	0.0	0.0	3.349E-12	-5.152E-13
3	1.500E 00	3.349E-12	-5.152E-13	0.0	-1.031E-01
4	2.000E 00	0.0	-1.031E-01	0.0	-4.219E-01
5	2.500E 00	0.0	-4.219E-01	0.0	-8.625E-01
6	3.000E 00	0.0	-9.656E-01	0.0	-1.322E 00
7	3.500E 00	0.0	-1.744E 00	0.0	-6.615E 01
8	4.000E 00	0.0	-6.711E 01	0.0	-1.310E 02
9	4.500E 00	0.0	-1.327E 02	0.0	-1.315E 02
10	5.000E 00	0.0	-1.986E 02	0.0	-1.320E 02
11	5.500E 00	0.0	-2.648E 02	0.0	-1.326E 02
12	6.000E 00	0.0	-3.312E 02	0.0	-1.332E 02
13	6.500E 00	0.0	-3.979E 02	0.0	-1.338E 02
14	7.000E 00	0.0	-4.650E 02	0.0	-1.344E 02
15	7.500E 00	0.0	-5.323E 02	0.0	-1.350E 02
16	8.000E 00	0.0	-5.999E 02	0.0	-1.356E 02
17	8.500E 00	0.0	-6.679E 02	5.035E 01	0.0
18	9.000E 00	0.0	-5.854E 02	2.224E 02	0.0
19	9.500E 00	0.0	-5.032E 02	2.218E 02	0.0
20	1.000E 01	0.0	-4.214E 02	2.211E 02	0.0
21	1.050E 01	0.0	-3.398E 02	2.205E 02	0.0
22	1.100E 01	3.198E 01	-2.586E 02	1.497E 02	0.0
23	1.150E 01	6.462E 01	-2.338E 02	8.422E 01	0.0
24	1.200E 01	9.696E 01	-2.094E 02	8.360E 01	0.0
25	1.250E 01	1.300E 02	-1.852E 02	8.298E 01	0.0
26	1.300E 01	1.627E 02	-1.614E 02	8.236E 01	0.0
27	1.350E 01	1.961E 02	-1.379E 02	8.174E 01	0.0
28	1.400E 01	2.298E 02	-1.147E 02	8.113E 01	0.0
29	1.450E 01	2.641E 02	-9.179E 01	8.051E 01	0.0
30	1.500E 01	2.986E 02	-6.921E 01	7.989E 01	0.0
31	1.550E 01	3.332E 02	-4.693E 01	7.927E 01	0.0
32	1.600E 01	3.677E 02	-2.496E 01	7.865E 01	0.0
33	1.650E 01	4.022E 02	-3.302E 00	7.803E 01	0.0
34	1.700E 01	4.363E 02	0.0	7.741E 01	0.0
35	1.750E 01	4.704E 02	0.0	7.679E 01	0.0
36	1.800E 01	5.043E 02	0.0	7.618E 01	0.0
37	1.850E 01	5.379E 02	0.0	8.689E 00	-8.689E 00
38	1.900E 01	5.043E 02	0.0	0.0	-7.618E 01
39	1.950E 01	4.704E 02	0.0	0.0	-7.679E 01
40	2.000E 01	4.363E 02	0.0	0.0	-7.741E 01
41	2.050E 01	4.022E 02	-3.302E 00	0.0	-7.803E 01
42	2.100E 01	3.677E 02	-2.496E 01	0.0	-7.865E 01
43	2.150E 01	3.332E 02	-4.693E 01	0.0	-7.927E 01
44	2.200E 01	2.986E 02	-6.921E 01	0.0	-7.989E 01
45	2.250E 01	2.641E 02	-9.179E 01	0.0	-8.051E 01
46	2.300E 01	2.298E 02	-1.147E 02	0.0	-8.113E 01
47	2.350E 01	1.961E 02	-1.379E 02	0.0	-8.174E 01
48	2.400E 01	1.627E 02	-1.614E 02	0.0	-8.236E 01
49	2.450E 01	1.300E 02	-1.852E 02	0.0	-8.298E 01
50	2.500E 01	9.696E 01	-2.094E 02	0.0	-8.360E 01
51	2.550E 01	6.462E 01	-2.338E 02	0.0	-8.422E 01
52	2.600E 01	3.198E 01	-2.586E 02	0.0	-1.497E 02
53	2.650E 01	0.0	-3.398E 02	0.0	-2.205E 02
54	2.700E 01	0.0	-4.214E 02	0.0	-2.211E 02
55	2.750E 01	0.0	-5.032E 02	0.0	-2.218E 02
56	2.800E 01	0.0	-5.854E 02	0.0	-2.224E 02
57	2.850E 01	0.0	-6.679E 02	0.0	-5.035E 01
58	2.900E 01	0.0	-5.999E 02	1.356E 02	0.0
59	2.950E 01	0.0	-5.323E 02	1.350E 02	0.0
60	3.000E 01	0.0	-4.650E 02	1.344E 02	0.0
61	3.050E 01	0.0	-3.979E 02	1.338E 02	0.0
62	3.100E 01	0.0	-3.312E 02	1.332E 02	0.0
63	3.150E 01	0.0	-2.648E 02	1.326E 02	0.0
64	3.200E 01	0.0	-1.986E 02	1.320E 02	0.0
65	3.250E 01	0.0	-1.327E 02	1.315E 02	0.0
66	3.300E 01	0.0	-6.711E 01	1.310E 02	0.0
67	3.350E 01	0.0	-1.744E 00	6.615E 01	0.0
68	3.400E 01	0.0	-9.656E-01	1.322E 00	0.0
69	3.450E 01	0.0	-4.219E-01	8.625E-01	0.0
70	3.500E 01	0.0	-1.031E-01	4.219E-01	0.0
71	3.550E 01	2.748E-12	-1.374E-12	1.031E-01	0.0
72	3.600E 01	0.0	0.0	1.374E-12	-2.748E-12
73	3.650E 01	0.0	0.0	0.0	0.0
74	3.700E 01	0.0	0.0	0.0	0.0
75	3.750E 01	0.0	0.0	0.0	0.0

The first stringer occurs at Sta. 7. The shear values printed are the average of the values to the left and right of the station. The value of 63.75 represents the average of -1.8 to the left and -130.5 to the right of the stringer input station.

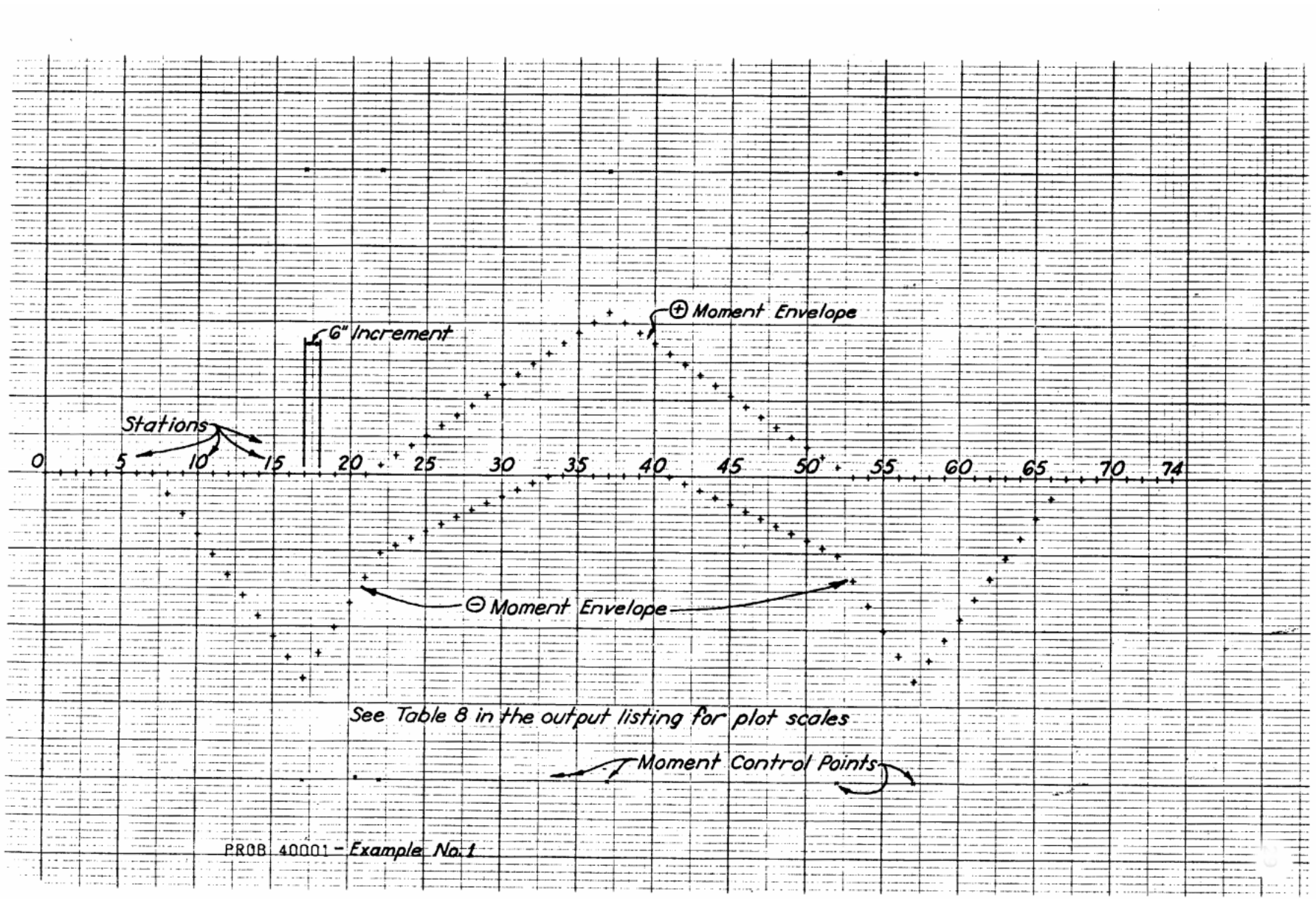
Ignore numbers of this type. They are computed "zeroes" or calculation remnants and may be neglected.

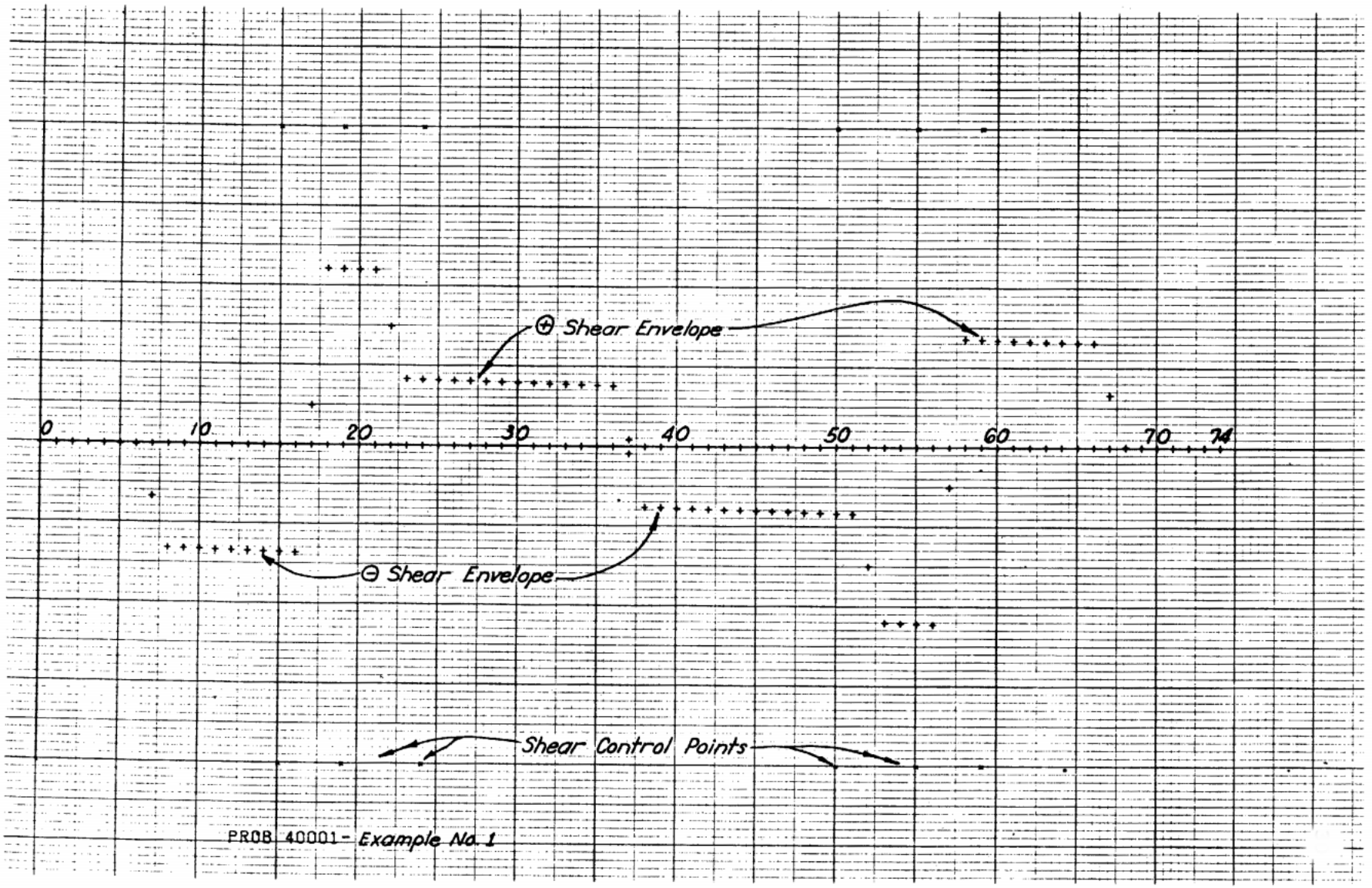
TABLE 7 -- MAXIMUM SUPPORT REACTIONS

STA	DIST X FT	MAX + REACT K	MAX - REACT K
1T	8.500E 00	3.513E 02	0.0
57	2.850E 01	3.513E 02	0.0

TABLE 8 -- SCALES FOR PLOT OUTPUT

DISTANCE	20. INCHES =	50.	FT
MOMENT	4. INCHES =	1000.	FT-K
SHEAR	4. INCHES =	400.	K


⊕ Moment Envelope
6" Increment
Stations
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
74
⊖ Moment Envelope
See Table 8 in the output listing for plot scales
Moment Control Points
PROB 40001 - Example No. 1


⊕ Shear Envelope
⊖ Shear Envelope
Shear Control Points
0
10
20
30
40
50
60
70
74
PROB 40001 - Example No. 1

EXAMPLE NO. 2 - A SKEWED BENT (PROBLEM 40002)

The Bent Cap Program calculates a skewed bent by working from a normal bent. The original concept was to be able to calculate a skewed bent from a normal bent and keep the columns lined up together. For situations where only the skewed bent dimensions are available it is then necessary to develop an artificial un-skewed or “normalized” bent to properly input the data. To do this, the skewed cap dimensions are projected on to a line at right angles to the roadway centerline (or other reference line), and the stationing proceeds as in Example 1. As can be seen from the sketch of the “normalized” bent for Example 2, this bent when “normalized” has the same roadway and beam spacing dimensions as Example 1, as expected, but has 3 columns instead of two due to the skew.

The program will use the normal roadway dimensions for distribution of the live load in the same manner as for an unskewed bent. These loads are then applied to the bent at the input stringer stations. The increment length is increased automatically by skewing the “normalized” (or input) increment length thus placing the stringers in the correct position on the skewed cap. The cap dead load is also adjusted automatically for the skew and the bent is then solved.

Since the roadway data for Example 2 is identical with Example 1, Table 2 has been held from Example 1 as indicated; consequently the card count for Table 2 is zero and left blank on the form. The skew angle is entered in degrees and decimals and in exponential form.

No cards will be included for Table 2 since this data has been held. “Blank card” should not be written in these spaces since the cards must be omitted when holding this table.

Table 3 has been filled out to reflect the geometry of the “normalized” bent.

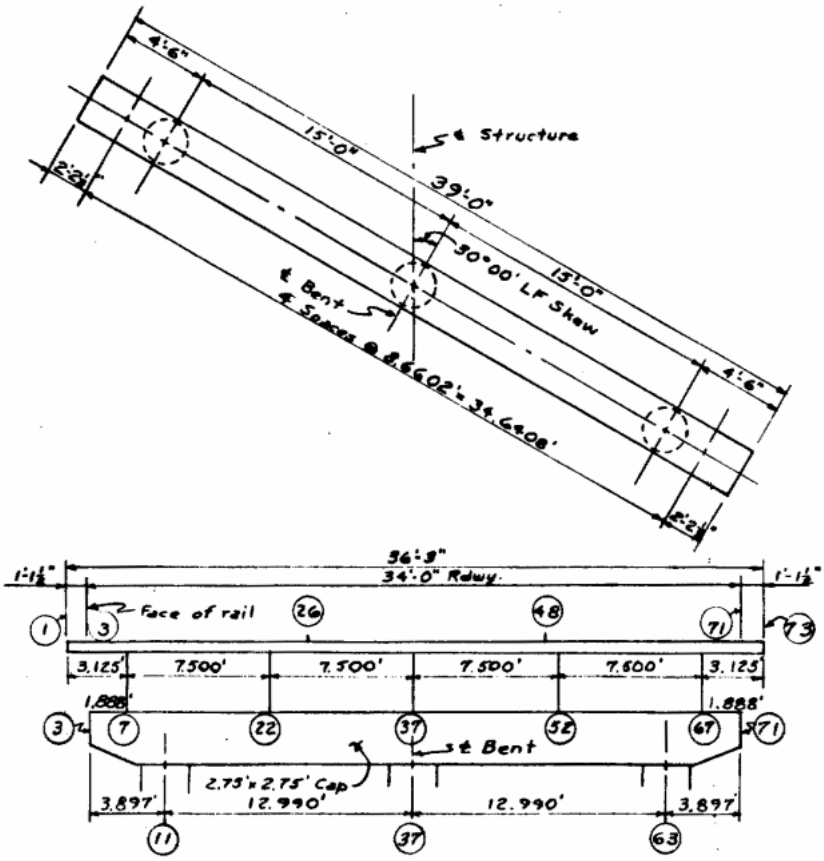
In Table 4 the cap data is entered (card 20) in the form usually used, i.e., an assumed, arbitrarily large stiffness, and a simple uniform load. No error is introduced with regard to stiffness (except for dead load deflections) and the error introduced with regard to the cap dead load moments will be negligible in terms of the total design moment. If the cap were not of uniform section between the columns, it would be necessary to input actual stiffness values.

File 1284

DESIGN L.K.W. DATE 6-74
CK. DSN. ..... DATE .....
DESIGN FOR Example No. 2 - 60' Spans Skewed Bent (BGp-C-34 HS)

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

COUNTY .....
CONTROL .....
I.P.E. .....
HIGHWAY .....
SHEET ..... OF .....



"NORMALIZED" BENT

Input Calculations for Example 2:

Span lengths - 60'-0" Ea. Side ; 30°00' LF Skew (3.000 E+01) Deg. ; T-2 Rail.

Increment length = 6", (5.000 E-01) ft.
No. Inc. = 74

Dead Loads for load factor design:

Beam load = 1.3 x 80.8 = 105 ^{K}/Beam
From Ex. 1

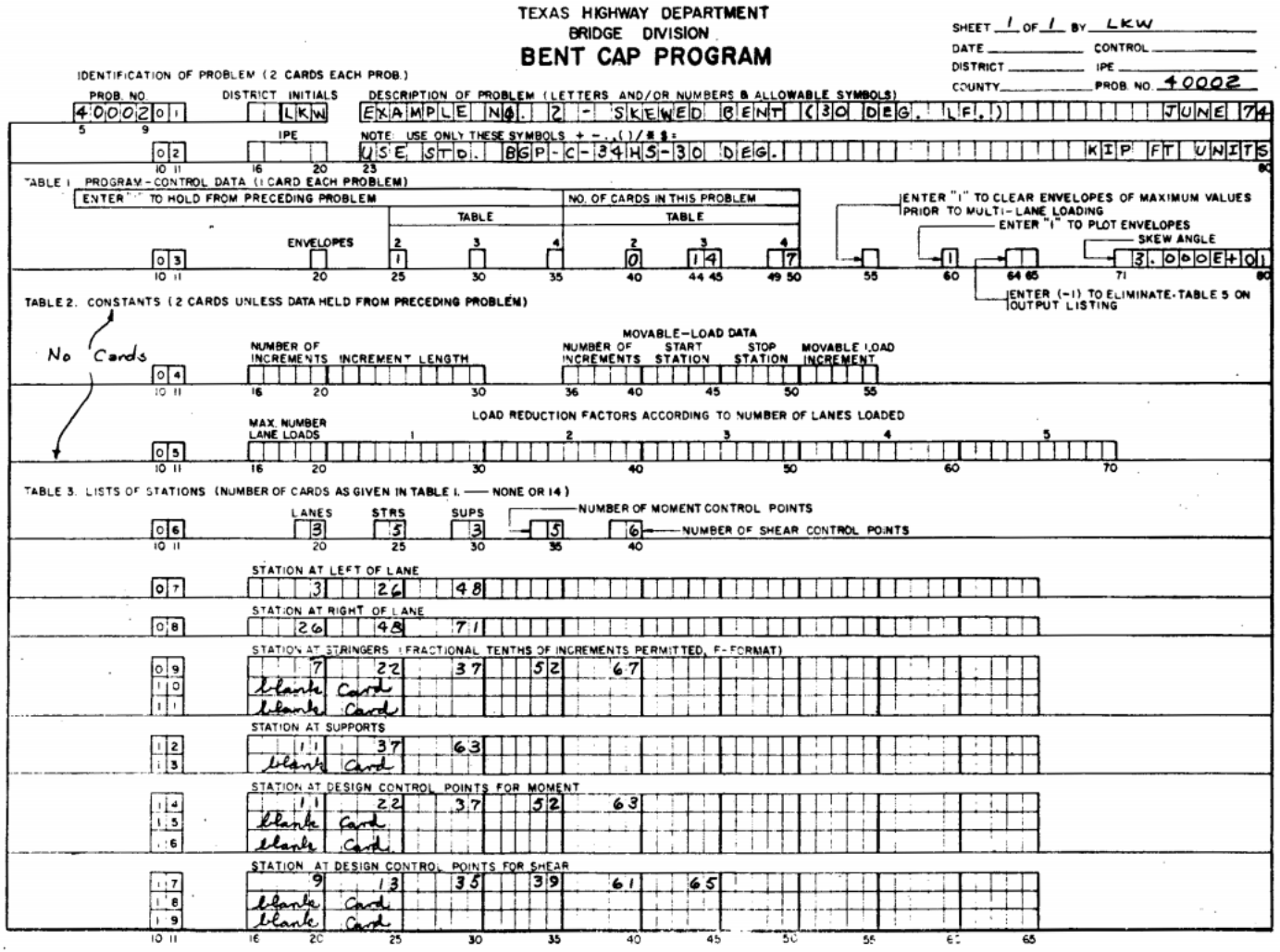
Live Load for load factor design

LL+I = 1.30 x $\frac{5}{8}$ x 3.980 = 8.623 ^{K}/Inc.
From Ex. 1

Bent Cap:

Stiffness: Assume 1.000 E+06

Dead Load = 1.3 x 2.75^2 x 0.150 = 1.475 ^{K}/ft.
= 1.475 x $\frac{1}{2}$ = 7.375 E-01 ^{K}/Inc.


TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION
BENT CAP PROGRAM
SHEET 1 OF 1 BY LKW
DATE
CONTROL
DISTRICT
IPE
COUNTY
PROB. NO. 40002
IDENTIFICATION OF PROBLEM (2 CARDS EACH PROB.)
PROB. NO.
DISTRICT INITIALS
DESCRIPTION OF PROBLEM (LETTERS AND/OR NUMBERS & ALLOWABLE SYMBOLS)
40002 01
LKW
EXAMPLE NO. 2 - SKEWED BENT (30 DEG. LF.)
JUNE 74
IPE
NOTE: USE ONLY THESE SYMBOLS + - . ( ) / * $ =
02
USE STD. BGP-C-34HS-30 DEG.
KIP FT UNITS
TABLE 1. PROGRAM-CONTROL DATA (1 CARD EACH PROBLEM)
ENTER "1" TO HOLD FROM PRECEDING PROBLEM
NO. OF CARDS IN THIS PROBLEM
TABLE
ENVELOPES
2
3
4
03
1
0
14
7
ENTER "1" TO CLEAR ENVELOPES OF MAXIMUM VALUES PRIOR TO MULTI-LANE LOADING
ENTER "1" TO PLOT ENVELOPES
SKEW ANGLE
1
3.0000E+01
ENTER (-1) TO ELIMINATE TABLE 5 ON OUTPUT LISTING
TABLE 2. CONSTANTS (2 CARDS UNLESS DATA HELD FROM PRECEDING PROBLEM)
No Cards
04
NUMBER OF INCREMENTS
INCREMENT LENGTH
MOVABLE-LOAD DATA
NUMBER OF INCREMENTS
START STATION
STOP STATION
MOVABLE LOAD INCREMENT
05
MAX. NUMBER LANE LOADS
LOAD REDUCTION FACTORS ACCORDING TO NUMBER OF LANES LOADED
1
2
3
4
5
TABLE 3. LISTS OF STATIONS (NUMBER OF CARDS AS GIVEN IN TABLE 1. — NONE OR 14)
06
LANES
3
STRS
5
SUPS
3
NUMBER OF MOMENT CONTROL POINTS
5
6
NUMBER OF SHEAR CONTROL POINTS
07
STATION AT LEFT OF LANE
3
26
48
08
STATION AT RIGHT OF LANE
26
48
71
STATION AT STRINGERS (FRACTIONAL TENTHS OF INCREMENTS PERMITTED, F-FORMAT)
09
7
22
37
52
67
10
blank Card
11
blank Card
STATION AT SUPPORTS
12
11
37
63
13
blank Card
STATION AT DESIGN CONTROL POINTS FOR MOMENT
14
11
22
37
52
63
15
blank Card
16
blank Card
STATION AT DESIGN CONTROL POINTS FOR SHEAR
17
9
13
35
39
61
65
18
blank Card
19
blank Card

File 5.29-1

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

BENT CAP PROGRAM (CONT'D)

TABLE 4 — STIFFNESS AND LOAD DATA (NUMBER OF CARDS AS GIVEN IN TABLE I. ALL DATA ADDED TO STORAGE)

PROBLEM NUMBER		FIXED OR MOVABLE STATION FROM	STATION TO	CONTINUED IF = 1	FIXED-POSITION DATA: BENDING-STIFFNESS OF CAP	SIDEWALK & SLAB LOADS	STRINGER & CAP LOADS	MOVABLE POSITION SLAB LOADS	REMARKS
40002	20	3	71		1.000E+06		-7.370E-01		Cap Properties
	21	7	7				-1.050E+02		
	22	22	22						Stringer D.L. (Ultimate)
	23	37	37						
	24	52	52						
	25	67	67						
	26	0	20					-8.623E+00	LL+I (Ultimate)
	27								
	28								
	29								
	30								
	31								
	32								
	33								
	34								
	35								
	36								
	37								
	38								
	39								
	40								
	41								
	42								
	43								
	44								
	45								
	46								
	47								
	48								
	49								
	50								
	51								
	52								
	53								
	54								
	55								
	56								
	57								

Column scale: 5 9 | 10 11 | 16 20 | 25 30 | 40 | 50 | 60 | 70

File 5.20-2

PROGRAM CAP 17 - DECK THD - MATLOCK,WBI,FE,JJP REVISION DATE # 12 JUN 68

PROB
40002 LKW EXAMPLE NO. 2 - SKEWED BENT (30 DEG. LF.) JUNE 74
USE STD. BGP-C-34MS-30 DEG. KIP FT UNITS

TABLE 1 -- PROGRAM-CONTROL DATA

	ENVELOPES OF MAXIMUMS	TABLE NUMBER 2	3	4
OPTIONS TO HOLD (IF=1) FROM PRECEDING PROB	0	1	0	0
NUMBER OF ADDITIONAL CARDS FOR CURRENT PROB		0	14	7
OPTION (IF=1) TO CLEAR ENVELOPES BEFORE LANE LOADINGS				0
OPTION (IF=1) TO PLOT DESIGN VARIABLE ENVELOPES				1
OPTION (IF=-1)TO OMIT OUTPUT TABLE 5				0
ANGLE OF SKEW, DEGREES				3.000E 01

TABLE 2 -- CONSTANTS

USING DATA FROM THE PREVIOUS PROBLEM

TABLE 3 -- LISTS OF STATIONS

	NUM OF LANES	NUM OF STRINGERS	NUM OF SUPPORTS	NUM MOM CONTR PTS	NUM SHEAR CONTR PTS
TOTAL	3	5	3	5	6

	1	2	3	4	5	6	7	8	9	10
LANE LEFT	3	26	48							
LANE RIGHT	26	48	71							
STRINGERS	7.0	22.0	37.0	52.0	67.0					
SUPPORTS	11	37	63							
MOM CONTR	11	22	37	52	63					
SHEAR CONTR	9	13	35	39	61	65				

TABLE 4 -- CAP STIFFNESS, AND DATA FOR BOTH FIXED AND MOVABLE LOADS

FIXED-OR-MOVABLE STA FROM	STA TO	CONTD IF=1	- - - - - FIXED-POSITION DATA - - - - - CAP BENDING STIFFNESS (K-FT*FT)	SIDEWALK, SLAB LOADS (K)	STRINGER, CAP LOADS (K)	MOVABLE-POSITION SLAB LOADS (K)
3	71	0	1.000E 06	0.0	-7.370E-01	0.0
7	7	0	0.0	0.0	-1.050E 02	0.0
22	22	0	0.0	0.0	-1.050E 02	0.0
37	37	0	0.0	0.0	-1.050E 02	0.0
52	52	0	0.0	0.0	-1.050E 02	0.0
67	67	0	0.0	0.0	-1.050E 02	0.0
0	20	0	0.0	0.0	0.0	-8.623E 00

TABLE 4A -- DEAD LOAD DEFLECTIONS

STA	DIST X (FT)	DEFLECTION (FT)
-1	-5.774E-01	0.0
0	0.0	0.0
1	5.774E-01	0.0
2	1.155E 00	-1.522D-03
3	1.732E 00	-1.328D-03
4	2.309E 00	-1.133D-03
5	2.887E 00	-9.384D-04
6	3.464E 00	-7.442D-04
7	4.041E 00	-5.507D-04
8	4.619E 00	-3.585D-04
9	5.196E 00	-1.885D-04
10	5.774E 00	-6.195D-05
11	6.351E 00	0.0
12	6.928E 00	-2.412D-05
13	7.506E 00	-1.197D-04
14	8.083E 00	-2.722D-04
15	8.660E 00	-4.674D-04
16	9.238E 00	-6.912D-04
17	9.815E 00	-9.295D-04
18	1.039E 01	-1.169D-03
19	1.097E 01	-1.395D-03
20	1.155E 01	-1.595D-03
21	1.212E 01	-1.755D-03
22	1.270E 01	-1.862D-03
23	1.328E 01	-1.903D-03
24	1.386E 01	-1.886D-03
25	1.443E 01	-1.818D-03
26	1.501E 01	-1.707D-03
27	1.559E 01	-1.560D-03
28	1.617E 01	-1.387D-03
29	1.674E 01	-1.194D-03
30	1.732E 01	-9.900D-04
31	1.790E 01	-7.841D-04
32	1.848E 01	-5.846D-04
33	1.905E 01	-4.005D-04
34	1.963E 01	-2.407D-04
35	2.021E 01	-1.144D-04
36	2.078E 01	-3.102D-05
37	2.136E 01	0.0
38	2.194E 01	-3.102D-05
39	2.252E 01	-1.144D-04
40	2.309E 01	-2.407D-04
41	2.367E 01	-4.005D-04
42	2.425E 01	-5.846D-04
43	2.483E 01	-7.841D-04
44	2.540E 01	-9.900D-04
45	2.598E 01	-1.194D-03
46	2.656E 01	-1.387D-03
47	2.714E 01	-1.560D-03
48	2.771E 01	-1.707D-03
49	2.829E 01	-1.818D-03
50	2.887E 01	-1.886D-03
51	2.944E 01	-1.903D-03
52	3.002E 01	-1.862D-03
53	3.060E 01	-1.755D-03
54	3.118E 01	-1.595D-03
55	3.175E 01	-1.395D-03
56	3.233E 01	-1.169D-03
57	3.291E 01	-9.295D-04
58	3.349E 01	-6.912D-04
59	3.406E 01	-4.674D-04
60	3.464E 01	-2.722D-04
61	3.522E 01	-1.197D-04
62	3.580E 01	-2.412D-05
63	3.637E 01	0.0
64	3.695E 01	-6.195D-05
65	3.753E 01	-1.885D-04
66	3.811E 01	-3.585D-04
67	3.868E 01	-5.507D-04
68	3.926E 01	-7.442D-04
69	3.984E 01	-9.384D-04
70	4.041E 01	-1.133D-03
71	4.099E 01	-1.328D-03
72	4.157E 01	-1.522D-03
73	4.215E 01	0.0
74	4.272E 01	0.0
75	4.330E 01	0.0

These results are incorrect due to the arbitrary value of cap stiffness used. They may be adjusted by hand to the correct values if desired. When fixed (dead) load deflections are important the actual stiffness should be input.

```
PROB (CONTD)
40002       LKW  EXAMPLE NO. 2 - SKEWED BENT (30 DEG. LF.)          JUNE 74
                 USE STD. BGP-C-34HS-30 DEG.                    KIP FT UNITS

TABLE 5 -- MULTI-LANE LOADING SUMMARY        ( *--CRITICAL NUMBER OF LANE LOADS)

    MOMENT ( FT-K )
     AT      DEAD LD     LANE     POSITIVE     LOAD AT      LANE     NEGATIVE     LOAD AT
     STA      EFFECT     ORDER    MAXIMUM     LANE STA     ORDER    MAXIMUM     LANE STA

      11  -2.582E 02
                          0     0.0                         0    -2.396E 02     1    3
                          1     0.0                         1    -2.396E 02     1    3
                          2     0.0                         2     0.0
                          3     0.0                         3     0.0
                          0*                                0*

      22   1.975E 02
                          0     3.308E 02     0   13        0    -5.761E 01     0   40
                          1     2.134E 02     1    6        1    -3.402E 01     3   48
                          2     9.543E 01     2   26        2     0.0
                          3     0.0                         3     0.0
                          0*                                0*

      37  -1.861E 02
                          0     0.0                         0    -1.362E 02     0   14
                          1     0.0                         1    -8.041E 01     1    6
                          2     0.0                         2    -8.041E 01     3   48
                          3     0.0                         3    -7.563E 01     2   26
                          0*                                3*

      52   1.975E 02
                          0     3.308E 02     0   41        0    -5.761E 01     0   14
                          1     2.134E 02     3   48        1    -3.402E 01     1    6
                          2     9.543E 01     2   28        2     0.0
                          3     0.0                         3     0.0
                          0*                                0*

      63  -2.582E 02
                          0     0.0                         0    -2.396E 02     3   51
                          1     0.0                         1    -2.396E 02     3   51
                          2     0.0                         2     0.0
                          3     0.0                         3     0.0
                          0*                                0*

    SHEAR ( K )
     AT      DEAD LD     LANE     POSITIVE     LOAD AT      LANE     NEGATIVE     LOAD AT
     STA      EFFECT     ORDER    MAXIMUM     LANE STA     ORDER    MAXIMUM     LANE STA

       9  -1.101E 02
                          0     0.0                         0    -1.038E 02     1    3
                          1     0.0                         1    -1.038E 02     1    3
                          2     0.0                         2     0.0
                          3     0.0                         3     0.0
                          0*                                0*

      13   7.474E 01
                          0     6.318E 01     0   10        0    -9.071E 00     0   40
```

At Station 22

Moment at Sta 22 due to random lane load.

Indicates random lane load.

Location of left edge of movable load.

Indicates that random lane controls moment.

At Station 37

Listed Random Lane first (0), Multilane by order of magnitude of contribution to envelope.

Station of the left edge of the load (not necessarily the lane boundary).

Effects of loads are always listed at 100% regardless of number of lanes.

Defined lanes are numbered in order from the left.

Envelope Accumulation at Sta. 37

		Random	Multilane	
Dead Ld Effect	=	-186.1	-186.1	Dead Load Moment
0 (-136.2)(1.0)	=	-136.2		Random Load @ Sta. 0
1 (-80.41)(0.9)	=		-72.37	Lane 1 load @ Sta. 6
2 (-80.41)(0.9)	=		-72.37	Lane 3 load @ Sta. 48
3 (-75.63)(0.9)	=		-68.02	Lane 2 load @ Sta. 26
3*		-322.3	-398.91	3 Lanes @ 90% + D.L.

Random Lane @ 100% + Dead Load

Indicates 3 Lanes @ 90% is maximum

The -398.91 is kept for the maximum envelopes as shown on the next page in the Table 6 output for Sta 37. The Random Lane result is discarded since it is less than the Multilane total.

		1	6.035E 01	1	6	1	-5.357E 00	3	48
		2	1.503E 01	2	26	2	0.0		
		3	0.0			3	0.0		
		2*				0*			
35	-4.898E 01								
		0	0.0			0	-5.391E 01	0	14
		1	0.0			1	-3.392E 01	1	6
		2	0.0			2	-1.975E 01	2	26
		3	0.0			3	-5.357E 00	3	48
		0*				0*			
39	4.898E 01								
		0	5.391E 01	0	40	0	0.0		
		1	3.392E 01	3	48	1	0.0		
		2	1.975E 01	2	28	2	0.0		
		3	5.357E 00	1	6	3	0.0		
		0*				0*			
61	-7.474E 01								
		0	9.071E 00	0	14	0	-6.318E 01	0	44
		1	5.357E 00	1	6	1	-6.035E 01	3	48
		2	0.0			2	-1.503E 01	2	28
		3	0.0			3	0.0		
		0*				2*			
65	1.101E 02								
		0	1.038E 02	3	51	0	0.0		
		1	1.038E 02	3	51	1	0.0		
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		0*				0*			

REACTION (K)

AT STA	DEAD LD EFFECT	LANE ORDER	POSITIVE MAXIMUM	LOAD AT LANE	STA	LANE ORDER	NEGATIVE MAXIMUM	LOAD AT LANE	STA
11	1.882E 02								
		0	1.572E 02	1	3	0	-9.071E 00	0	48
		1	1.572E 02	1	3	1	-5.357E 00	3	48
		2	1.503E 01	2	26	2	0.0		
		3	0.0			3	0.0		
		2*				0*			
37	2.064E 02								
		0	1.493E 02	2	27	0	0.0		
		1	1.493E 02	2	27	1	0.0		
		2	4.388E 01	3	48	2	0.0		
		3	4.388E 01	1	6	3	0.0		
		3*				0*			
63	1.882E 02								
		0	1.572E 02	3	51	0	-9.071E 00	0	14
		1	1.572E 02	3	51	1	-5.357E 00	1	6
		2	1.503E 01	2	28	2	0.0		
		3	0.0			3	0.0		
		2*				0*			

TABLE 6 -- ENVELOPES OF MAXIMUM VALUES

STA	DIST X (FT)	MAX + MOM (FT-K)	MAX - MOM (FT-K)	MAX + SHEAR (K)	MAX - SHEAR (K)
-1	-5.774E-01	0.0	0.0	0.0	0.0
0	0.0	0.0	0.0	0.0	0.0
1	5.774E-01	0.0	0.0	0.0	0.0
2	1.155E 00	0.0	0.0	1.479E-12	-1.056E-12
3	1.732E 00	1.708E-12	-1.220E-12	0.0	-2.128E-01
4	2.309E 00	0.0	-2.457E-01	0.0	-8.510E-01
5	2.887E 00	0.0	-9.827E-01	0.0	-1.702E 00
6	3.464E 00	0.0	-2.211E 00	0.0	-2.553E 00
7	4.041E 00	0.0	-3.931E 00	0.0	-1.078E 02
8	4.619E 00	0.0	-1.267E 02	0.0	-2.130E 02
9	5.196E 00	0.0	-2.499E 02	0.0	-2.139E 02
10	5.774E 00	0.0	-3.736E 02	0.0	-2.147E 02
11	6.351E 00	0.0	-4.978E 02	4.069E 00	-4.283E 01
12	6.928E 00	0.0	-4.231E 02	1.510E 02	0.0
13	7.506E 00	0.0	-3.488E 02	1.501E 02	0.0
14	8.083E 00	0.0	-2.750E 02	1.493E 02	0.0
15	8.660E 00	1.486E 01	-2.017E 02	1.484E 02	0.0
16	9.238E 00	8.783E 01	-1.289E 02	1.476E 02	0.0
17	9.815E 00	1.610E 02	-5.664E 01	1.467E 02	0.0
18	1.039E 01	2.346E 02	0.0	1.459E 02	0.0
19	1.097E 01	3.081E 02	0.0	1.450E 02	0.0
20	1.155E 01	3.819E 02	0.0	1.442E 02	0.0
21	1.212E 01	4.553E 02	0.0	1.433E 02	0.0
22	1.270E 01	5.283E 02	0.0	3.385E 01	0.0
23	1.328E 01	4.751E 02	0.0	0.0	-9.268E 01
24	1.386E 01	4.213E 02	0.0	0.0	-9.353E 01
25	1.443E 01	3.671E 02	0.0	0.0	-9.438E 01
26	1.501E 01	3.124E 02	0.0	0.0	-9.523E 01
27	1.559E 01	2.572E 02	-1.873E 00	0.0	-9.609E 01
28	1.617E 01	2.015E 02	-3.171E 01	0.0	-9.694E 01
29	1.674E 01	1.454E 02	-6.203E 01	0.0	-9.779E 01
30	1.732E 01	8.870E 01	-9.285E 01	0.0	-9.864E 01
31	1.790E 01	3.154E 01	-1.242E 02	0.0	-9.949E 01
32	1.848E 01	0.0	-1.560E 02	0.0	-1.003E 02
33	1.905E 01	0.0	-1.882E 02	0.0	-1.012E 02
34	1.963E 01	0.0	-2.247E 02	0.0	-1.020E 02
35	2.021E 01	0.0	-2.821E 02	0.0	-1.029E 02
36	2.078E 01	0.0	-3.399E 02	0.0	-1.037E 02
→ 37	2.136E 01	0.0	-3.990E 02	2.242E 01	-2.242E 01
38	2.194E 01	0.0	-3.418E 02	1.037E 02	0.0
39	2.252E 01	0.0	-2.851E 02	1.029E 02	0.0
40	2.309E 01	0.0	-2.289E 02	1.020E 02	0.0
41	2.367E 01	0.0	-1.882E 02	1.012E 02	0.0
42	2.425E 01	0.0	-1.560E 02	1.003E 02	0.0
43	2.483E 01	3.154E 01	-1.242E 02	9.949E 01	0.0
44	2.540E 01	8.870E 01	-9.285E 01	9.864E 01	0.0
45	2.598E 01	1.454E 02	-6.203E 01	9.779E 01	0.0
46	2.656E 01	2.015E 02	-3.171E 01	9.694E 01	0.0
47	2.714E 01	2.572E 02	-1.873E 00	9.609E 01	0.0
48	2.771E 01	3.124E 02	0.0	9.523E 01	0.0
49	2.829E 01	3.671E 02	0.0	9.438E 01	0.0
50	2.887E 01	4.213E 02	0.0	9.353E 01	0.0
51	2.944E 01	4.751E 02	0.0	9.268E 01	0.0
52	3.002E 01	5.283E 02	0.0	0.0	-3.385E 01
53	3.060E 01	4.553E 02	0.0	0.0	-1.433E 02
54	3.118E 01	3.819E 02	0.0	0.0	-1.442E 02
55	3.175E 01	3.081E 02	0.0	0.0	-1.450E 02

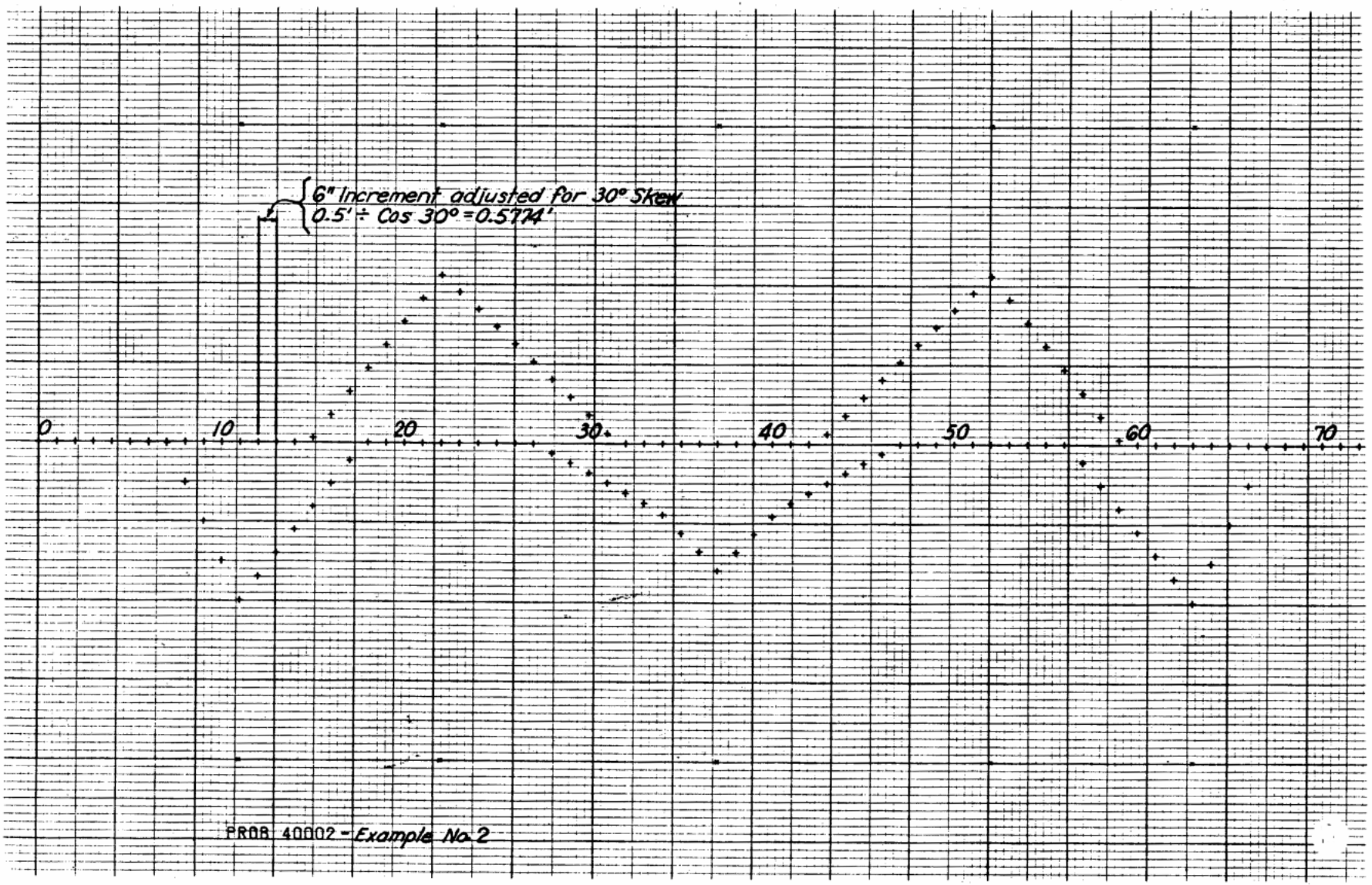
56	3.233E 01	2.346E 02	0.0	0.0	-1.459E 02
57	3.291E 01	1.610E 02	-5.664E 01	0.0	-1.467E 02
58	3.349E 01	8.783E 01	-1.289E 02	0.0	-1.476E 02
59	3.406E 01	1.486E 01	-2.017E 02	0.0	-1.484E 02
60	3.464E 01	0.0	-2.750E 02	0.0	-1.493E 02
61	3.522E 01	0.0	-3.488E 02	0.0	-1.501E 02
62	3.580E 01	0.0	-4.231E 02	0.0	-1.510E 02
63	3.637E 01	0.0	-4.978E 02	4.283E 01	-4.069E 00
64	3.695E 01	0.0	-3.736E 02	2.147E 02	0.0
65	3.753E 01	0.0	-2.499E 02	2.139E 02	0.0
66	3.811E 01	0.0	-1.267E 02	2.130E 02	0.0
67	3.868E 01	0.0	-3.931E 00	1.078E 02	0.0
68	3.926E 01	0.0	-2.211E 00	2.553E 00	0.0
69	3.984E 01	0.0	-9.827E-01	1.702E 00	0.0
70	4.041E 01	0.0	-2.457E-01	8.510E-01	0.0
71	4.099E 01	1.952E-12	-1.301E-12	2.128E-01	0.0
72	4.157E 01	0.0	0.0	1.127E-12	-1.690E-12
73	4.215E 01	0.0	0.0	0.0	0.0
74	4.272E 01	0.0	0.0	0.0	0.0
75	4.330E 01	0.0	0.0	0.0	0.0

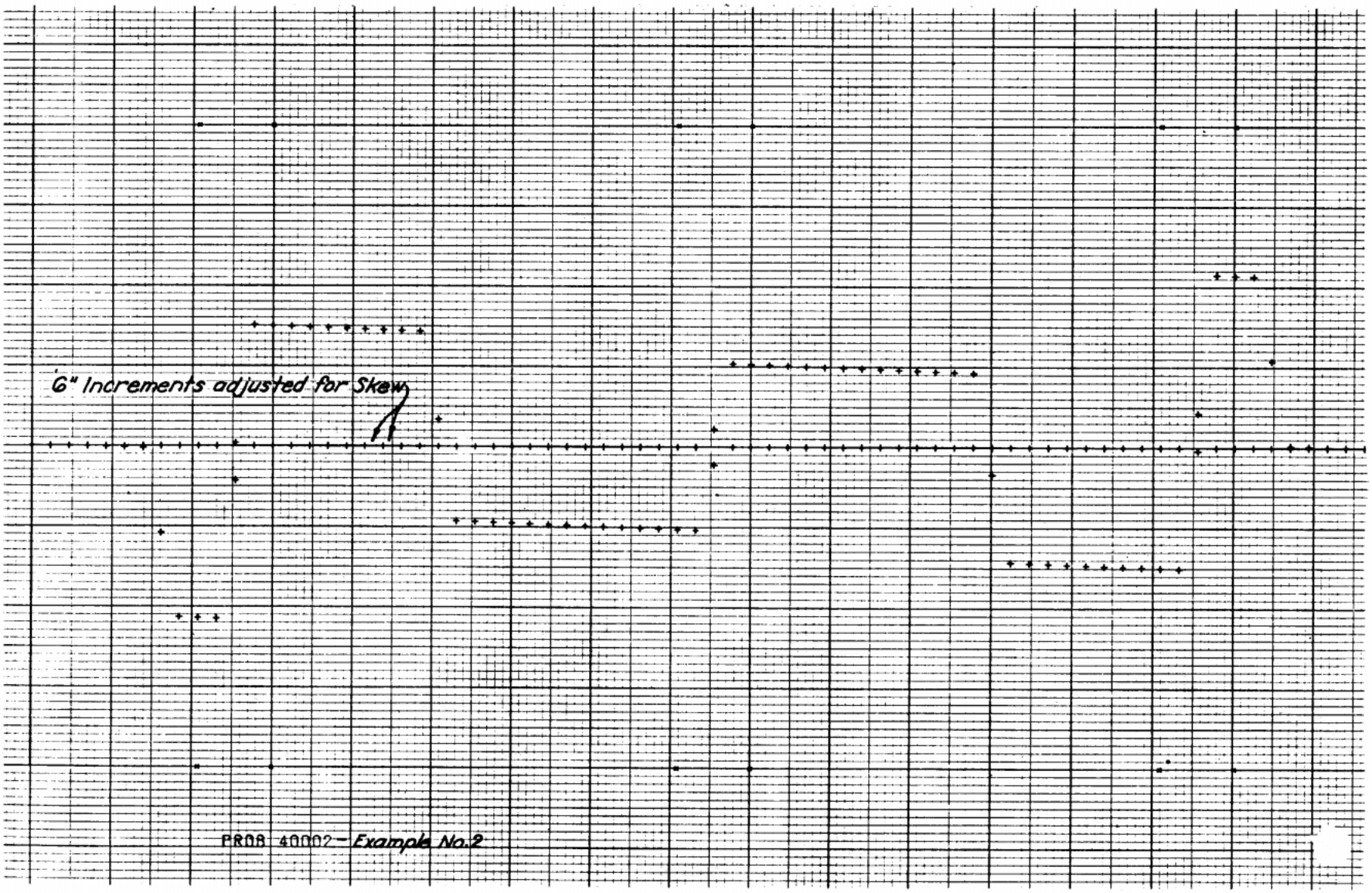
TABLE 7 -- MAXIMUM SUPPORT REACTIONS

STA	DIST X FT	MAX + REACT K	MAX - REACT K
11	6.351E 00	3.605E 02	0.0
37	2.136E 01	4.197E 02	0.0
63	3.637E 01	3.605E 02	0.0

TABLE 8 -- SCALES FOR PLOT OUTPUT

DISTANCE	20. INCHES =	50.	FT
MOMENT	4. INCHES =	1000.	FT-K
SHEAR	4. INCHES =	400.	K


6" Increment adjusted for 30° Skew
0.5' ÷ Cos 30° = 0.5774'
0
10
20
30
40
50
60
70
PROB 40002 - Example No. 2


6" Increments adjusted for Skew
PROB 40002 – Example No. 2

EXAMPLE NO. 3- SKEWED TRANSITION BENT (PROBS 40003 AND 40004)

Several methods have been used to analyze transition bents. The one used in this Example is suggested since it is the simplest yet discovered. The relative precision is more than enough for bent cap design.

This method requires that two problems be run. The first problem is run as if the bent were being designed for appropriate live loadings with the number and location of beams from one span. The envelopes are then held and stored in the second problem which is then run for the live loading with the number and location of beams for the other span. The envelopes of the second problem then consist of the controlling maximums from both problems. The actual stringer dead loads and the live loads are all input in the first problem.

Referring to the input sheet for problem 40003, Table 1 shows that Tables 2 and 3 have been retained from the previous problem for the five beam, 34 foot roadway section. No cards are used in Tables 2 and 3 since they have both been held. Since a “normalized” bent is being input, a different skew angle could have been used if desired; however, the same skew angle has been kept as in Example 2.

Table 4 shows all the loads input to the cap and to demonstrate that no particular order of entry is required, a different sequence is used. Also note that stringer dead loads have been entered separately for the outside stringers at stations 7 and 67. The program will properly combine these loads algebraically. If desired, these loads can be combined and entered as totals. The remaining cards show the input for the ultimate loads required for load factor design.

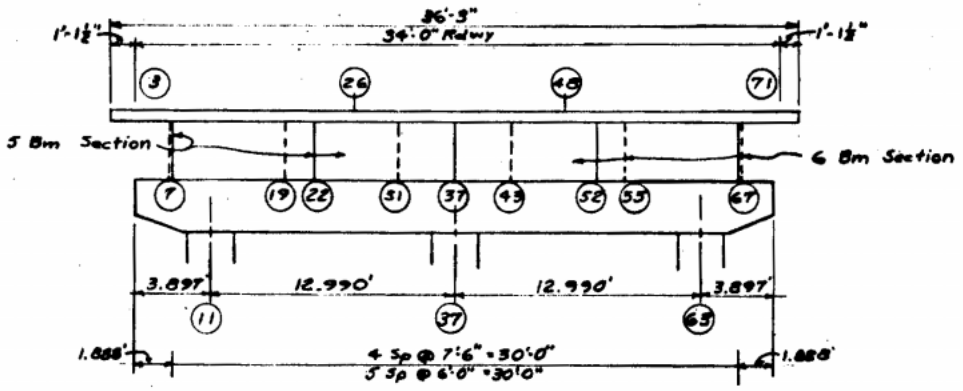
Referring now to the input for problem 40004, Table 1 shows that envelopes from the previous problem have been held as have Tables 2 and 4. Plots of the final envelopes have been requested and the 30 degree skew angle has been entered. Table 2 is left blank and Table 3 is filled out for the six beam, 34 foot roadway section. Table 4 is left blank since it has been retained from the previous problem.

File 1284

DESIGN LKW DATE 6-74
CK. DSN. ..... DATE .....
DESIGN FOR Example No. 3 - 60'& 90' Spans Skewed Transition Bent (5 Gp - T-34 HS) (30°)

TEXAS
HIGHWAY DEPARTMENT
BRIDGE DIVISION

COUNTY .....
CONTROL .....
I.P.E. .....
HIGHWAY .....
SHEET ..... OF .....



NORMALIZED BENT

Input Data Calculations:
Span lengths = 60' & 90'-30° Skew

Use 6" Increment = 5.000 E-01 '
No. of Inc. = 74

Stringer Dead Loads:
From 60' Span:
Slab & Diafs = ½ x 4.05 x 55.2 = 112 ᵏ
Rail (T-2) = ½ x 2 x 0.218 x 60 = 13
Beams = ½ x 298.33 x 0.515 = 77
Total = 202 ᵏ

D.L. Stringer Reaction = 202 ÷ 5 = 40.4 ᵏ/Str.
Ult. D.L. = 1.30 x 40.4 = 5.250 E+01 ᵏ/Str.

From 90' Span:
Slab & Diafs. = ½ x 4.05 x 79.8 = 162 ᵏ
Rail = ½ x 2 x 0.218 x 90 = 20
Beams = ½ x 538.00 x 0.515 = 139
321 ᵏ

D. L. Stringer Reaction = 321 ÷ 6 = 53.5 ᵏ
Ult D.L. = 1.30 x 53.5 = 6.960 E+01 ᵏ/Str.

Live Load:
I = 50 / (75+125) = 25.0%
LL Bent Reaction = ½ (90+60) x 0.64 + 18
= 66 ᵏ/Lane
Ult. (LL+I)/Lane = 1.30 x ⅘ x 1.25 x 66.0 = 179 ᵏ
Distributed Lane Load = 179 ÷ 20
= 8.950 E+00 ᵏ/Lane

Cap Data:
Stiffness: Assume 1.000 E+06
Weight: 5.670 E-01 (From Ex. 2)

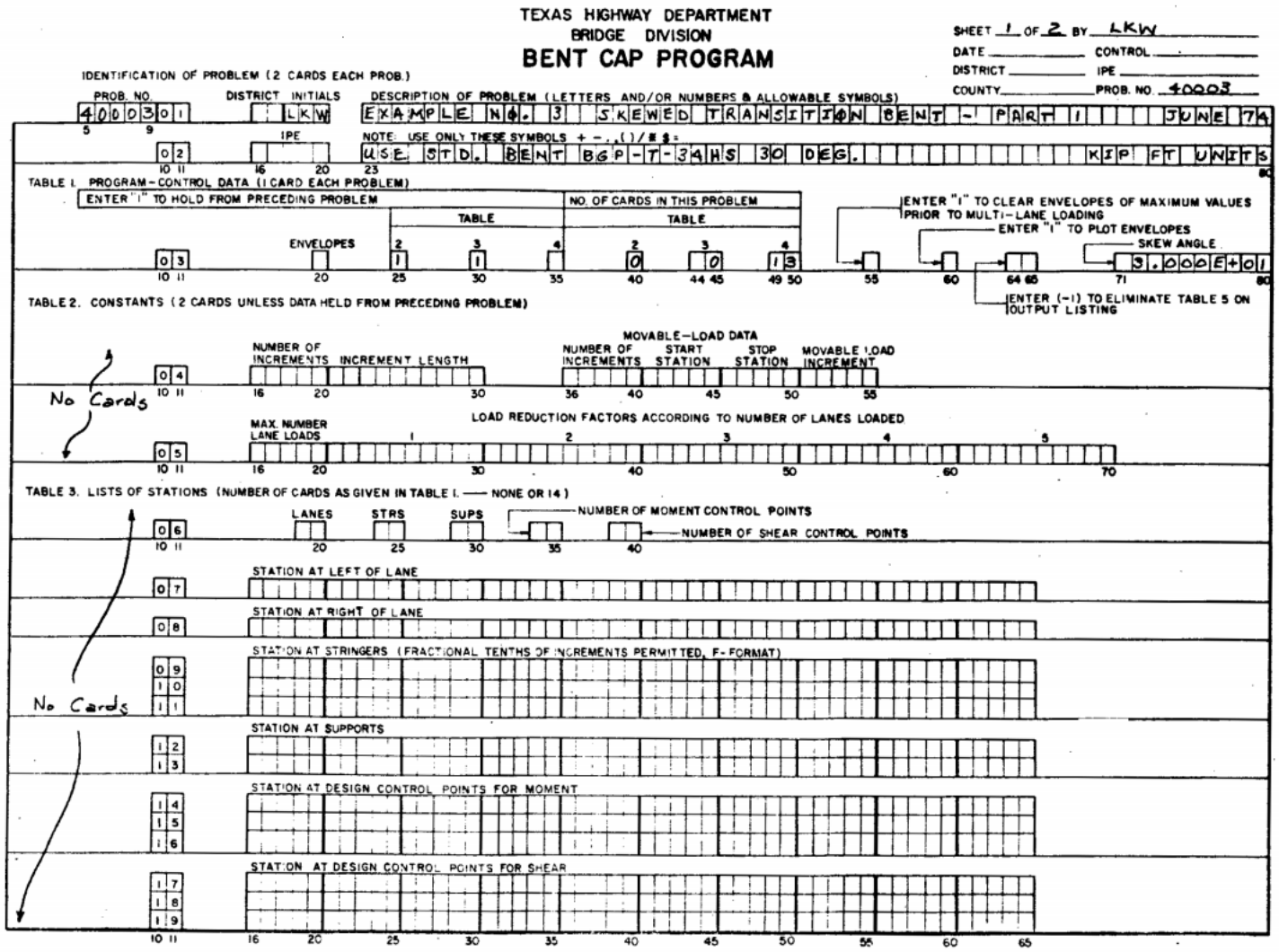

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION
BENT CAP PROGRAM
SHEET 1 OF 2 BY LKW
DATE
CONTROL
DISTRICT
IPE
COUNTY
PROB. NO. 40003
IDENTIFICATION OF PROBLEM (2 CARDS EACH PROB.)
PROB. NO.
DISTRICT INITIALS
DESCRIPTION OF PROBLEM (LETTERS AND/OR NUMBERS & ALLOWABLE SYMBOLS)
4000301
LKW
EXAMPLE NO. 3 SKEWED TRANSITION BENT - PART I JUNE 74
IPE
NOTE: USE ONLY THESE SYMBOLS + - . ( ) / # $ =
02
USE STD. BENT BGP-T-34HS 30 DEG. KIP FT UNITS
TABLE 1. PROGRAM-CONTROL DATA (1 CARD EACH PROBLEM)
ENTER "1" TO HOLD FROM PRECEDING PROBLEM
NO. OF CARDS IN THIS PROBLEM
TABLE
ENVELOPES
2 3 4
2 3 4
ENTER "1" TO CLEAR ENVELOPES OF MAXIMUM VALUES PRIOR TO MULTI-LANE LOADING
ENTER "1" TO PLOT ENVELOPES
SKEW ANGLE
03
1 1
0 0 1 3
3.000E+01
ENTER (-1) TO ELIMINATE TABLE 5 ON OUTPUT LISTING
TABLE 2. CONSTANTS (2 CARDS UNLESS DATA HELD FROM PRECEDING PROBLEM)
MOVABLE-LOAD DATA
NUMBER OF INCREMENTS
INCREMENT LENGTH
NUMBER OF INCREMENTS
START STATION
STOP STATION
MOVABLE LOAD INCREMENT
04
No Cards
MAX. NUMBER LANE LOADS
LOAD REDUCTION FACTORS ACCORDING TO NUMBER OF LANES LOADED
1 2 3 4 5
05
TABLE 3. LISTS OF STATIONS (NUMBER OF CARDS AS GIVEN IN TABLE I. — NONE OR 14)
LANES
STRS
SUPS
NUMBER OF MOMENT CONTROL POINTS
NUMBER OF SHEAR CONTROL POINTS
06
STATION AT LEFT OF LANE
07
STATION AT RIGHT OF LANE
08
STATION AT STRINGERS (FRACTIONAL TENTHS OF INCREMENTS PERMITTED, F-FORMAT)
09 10 11
No Cards
STATION AT SUPPORTS
12 13
STATION AT DESIGN CONTROL POINTS FOR MOMENT
14 15 16
STATION AT DESIGN CONTROL POINTS FOR SHEAR
17 18 19

Fig. 5.29-1

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

BENT CAP PROGRAM (CONT'D)

TABLE 4

STIFFNESS AND LOAD DATA (NUMBER OF CARDS AS GIVEN IN TABLE I. ALL DATA ADDED TO STORAGE)

PROBLEM NUMBER		FIXED OR MOVABLE STATION FROM	STATION TO	CONTINUED IF=1	FIXED-POSITION DATA: BENDING-STIFFNESS OF CAP	SIDEWALK & SLAB LOADS	STRINGER & CAP LOADS	MOVABLE POSITION SLAB LOADS	REMARKS
40003	20	0	20					-8.950E+00	Ultimate LL+I
5 9	21	8	71		1.000E+06		-5.670E-01		Cap Properties
	22	7	7				-5.250E+01		
	23	22	22						
	24	37	37						Ult. Stringer D.L. (60' Span)
	25	52	52						
	26	67	67						
	27	7	7				-6.960E+01		
	28	19	19						
	29	31	31						Ult. Stringer D.L. (90' Span)
	30	43	43						
	31	55	55						
	32	67	67						
	33								
	34								
	35								
	36								
	37								
	38								
	39								
	40								
	41								
	42								
	43								
	44								
	45								
	46								
	47								
	48								
	49								
	50								
	51								
	52								
	53								
	54								
	55								
	56								
	57								
10 11		16 20	25 30		40	50	60	70	

File 5.29-2

PROGRAM CAP 17 - DECK THD - MATLOCK,WBI,FE,JJP REVISION DATE # 12 JUN 68

PROB
40003 LKW EXAMPLE NO. 3 SKEWED TRANSITION BENT - PART 1 JUNE 74
USE STD. BENT BGP-T-34MS 30 DEG. KIP FT UNITS

TABLE 1 -- PROGRAM-CONTROL DATA

	ENVELOPES OF MAXIMUMS	TABLE NUMBER 2	3	4
OPTIONS TO HOLD (IF=1) FROM PRECEDING PROB	0	1	1	0
NUMBER OF ADDITIONAL CARDS FOR CURRENT PROB		0	0	13

OPTION (IF=1) TO CLEAR ENVELOPES BEFORE LANE LOADINGS	0
OPTION (IF=1) TO PLOT DESIGN VARIABLE ENVELOPES	0
OPTION (IF=-1)TO OMIT OUTPUT TABLE 5	0
ANGLE OF SKEW, DEGREES	3.000E 01

TABLE 2 -- CONSTANTS

USING DATA FROM THE PREVIOUS PROBLEM

TABLE 3 -- LISTS OF STATIONS

USING DATA FROM THE PREVIOUS PROBLEM

TABLE 4 -- CAP STIFFNESS, AND DATA FOR BOTH FIXED AND MOVABLE LOADS

FIXED-OR-MOVABLE STA FROM	STA TO	CONTD IF=1	FIXED-POSITION DATA - CAP BENDING STIFFNESS (K-FT*FT)	SIDEWALK, SLAB LOADS (K)	STRINGER, CAP LOADS (K)	MOVABLE-POSITION SLAB LOADS (K)
0	20	0	0.0	0.0	0.0	-8.950E 00
3	71	0	1.000E 06	0.0	-5.670E-01	0.0
7	7	0	0.0	0.0	-5.250E 01	0.0
22	22	0	0.0	0.0	-5.250E 01	0.0
37	37	0	0.0	0.0	-5.250E 01	0.0
52	52	0	0.0	0.0	-5.250E 01	0.0
67	67	0	0.0	0.0	-5.250E 01	0.0
7	7	0	0.0	0.0	-6.960E 01	0.0
19	19	0	0.0	0.0	-6.960E 01	0.0
31	31	0	0.0	0.0	-6.960E 01	0.0
43	43	0	0.0	0.0	-6.960E 01	0.0
55	55	0	0.0	0.0	-6.960E 01	0.0
67	67	0	0.0	0.0	-6.960E 01	0.0

TABLE 4A -- DEAD LOAD DEFLECTIONS

STA	DIST X (FT)	DEFLECTION (FT)
-1	-5.774E-01	0.0
0	0.0	0.0
1	5.774E-01	0.0
2	1.155E 00	-8.489D-04
3	1.732E 00	-7.261D-04
4	2.309E 00	-6.033D-04
5	2.887E 00	-4.806D-04
6	3.464E 00	-3.581D-04
7	4.041E 00	-2.362D-04
8	4.619E 00	-1.153D-04
9	5.196E 00	-1.953D-05
10	5.774E 00	2.703D-05
11	6.351E 00	0.0
12	6.928E 00	-1.251D-04
13	7.506E 00	-3.288D-04
14	8.083E 00	-5.922D-04
15	8.660E 00	-8.961D-04
16	9.238E 00	-1.222D-03
17	9.815E 00	-1.550D-03
18	1.039E 01	-1.862D-03
19	1.097E 01	-2.141D-03
20	1.155E 01	-2.366D-03
21	1.212E 01	-2.534D-03
22	1.270E 01	-2.639D-03
23	1.328E 01	-2.677D-03
24	1.386E 01	-2.654D-03
25	1.443E 01	-2.575D-03
26	1.501E 01	-2.446D-03
27	1.559E 01	-2.273D-03
28	1.617E 01	-2.062D-03
29	1.674E 01	-1.820D-03
30	1.732E 01	-1.552D-03
31	1.790E 01	-1.266D-03
32	1.848E 01	-9.672D-04
33	1.905E 01	-6.765D-04
34	1.963E 01	-4.140D-04
35	2.021E 01	-2.001D-04
36	2.078E 01	-5.521D-05
37	2.136E 01	0.0
38	2.194E 01	-5.521D-05
39	2.252E 01	-2.001D-04
40	2.309E 01	-4.140D-04
41	2.367E 01	-6.765D-04
42	2.425E 01	-9.672D-04
43	2.483E 01	-1.266D-03
44	2.540E 01	-1.552D-03
45	2.598E 01	-1.820D-03
46	2.656E 01	-2.062D-03
47	2.714E 01	-2.273D-03
48	2.771E 01	-2.446D-03
49	2.829E 01	-2.575D-03
50	2.887E 01	-2.654D-03
51	2.944E 01	-2.677D-03
52	3.002E 01	-2.639D-03
53	3.060E 01	-2.534D-03
54	3.118E 01	-2.366D-03
55	3.175E 01	-2.141D-03

56	3.233E 01	-1.862D-03
57	3.291E 01	-1.550D-03
58	3.349E 01	-1.222D-03
59	3.406E 01	-8.961D-04
60	3.464E 01	-5.922D-04
61	3.522E 01	-3.288D-04
62	3.580E 01	-1.251D-04
63	3.637E 01	0.0
64	3.695E 01	2.703D-05
65	3.753E 01	-1.953D-05
66	3.811E 01	-1.153D-04
67	3.868E 01	-2.362D-04
68	3.926E 01	-3.581D-04
69	3.984E 01	-4.806D-04
70	4.041E 01	-6.033D-04
71	4.099E 01	-7.261D-04
72	4.157E 01	-8.489D-04
73	4.215E 01	0.0
74	4.272E 01	0.0
75	4.330E 01	0.0

TABLE 5 -- MULTI-LANE LOADING SUMMARY (*--CRITICAL NUMBER OF LANE LOADS)

MOMENT (FT-K) AT STA	DEAD LD EFFECT	LANE ORDER	POSITIVE MAXIMUM	LOAD AT LANE	STA	LANE ORDER	NEGATIVE MAXIMUM	LOAD AT LANE	STA
11	-2.941E 02								
		0	0.0			0	-2.487E 02	1	3
		1	0.0			1	-2.487E 02	1	3
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		0*				0*			
22	2.012E 02								
		0	3.433E 02	0	13	0	-5.979E 01	0	40
		1	2.215E 02	1	6	1	-3.531E 01	3	48
		2	9.905E 01	2	26	2	0.0		
		3	0.0			3	0.0		
		0*				0*			
37	-3.313E 02								
		0	0.0			0	-1.413E 02	0	14
		1	0.0			1	-8.346E 01	1	6
		2	0.0			2	-8.346E 01	3	48
		3	0.0			3	-7.850E 01	2	26
		0*				3*			
52	2.012E 02								
		0	3.433E 02	0	41	0	-5.979E 01	0	14
		1	2.215E 02	3	48	1	-3.531E 01	1	6
		2	9.905E 01	2	28	2	0.0		
		3	0.0			3	0.0		
		0*				0*			
63	-2.941E 02								
		0	0.0			0	-2.487E 02	3	51
		1	0.0			1	-2.487E 02	3	51
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		0*				0*			

SHEAR (K) AT STA	DEAD LD EFFECT	LANE ORDER	POSITIVE MAXIMUM	LOAD AT LANE	STA	LANE ORDER	NEGATIVE MAXIMUM	LOAD AT LANE	STA
9	-1.260E 02								
		0	0.0			0	-1.077E 02	1	3
		1	0.0			1	-1.077E 02	1	3
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		0*				0*			
13	9.926E 01								
		0	6.558E 01	0	10	0	-9.415E 00	0	40

		1	6.264E 01	1	6	1	-5.560E 00	3	48
		2	1.560E 01	2	26	2	0.0		
		3	0.0			3	0.0		
		2*				0*			
35	-1.068E 02								
		0	0.0			0	-5.595E 01	0	14
		1	0.0			1	-3.521E 01	1	6
		2	0.0			2	-2.050E 01	2	26
		3	0.0			3	-5.560E 00	3	48
		0*				0*			
39	1.068E 02								
		0	5.595E 01	0	40	0	0.0		
		1	3.521E 01	3	48	1	0.0		
		2	2.050E 01	2	28	2	0.0		
		3	5.560E 00	1	6	3	0.0		
		0*				0*			
61	-9.926E 01								
		0	9.415E 00	0	14	0	-6.558E 01	0	44
		1	5.560E 00	1	6	1	-6.264E 01	3	48
		2	0.0			2	-1.560E 01	2	28
		3	0.0			3	0.0		
		0*				2*			
65	1.260E 02								
		0	1.077E 02	3	51	0	0.0		
		1	1.077E 02	3	51	1	0.0		
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		0*				0*			

REACTION (K)

AT STA	DEAD LD EFFECT	LANE ORDER	POSITIVE MAXIMUM	LOAD AT LANE	STA	LANE ORDER	NEGATIVE MAXIMUM	LOAD AT LANE	STA
11	2.279E 02								
		0	1.632E 02	1	3	0	-9.415E 00	0	40
		1	1.632E 02	1	3	1	-5.560E 00	3	48
		2	1.560E 01	2	26	2	0.0		
		3	0.0			3	0.0		
		2*				0*			
37	2.688E 02								
		0	1.549E 02	2	27	0	0.0		
		1	1.549E 02	2	27	1	0.0		
		2	4.554E 01	1	6	2	0.0		
		3	4.554E 01	3	48	3	0.0		
		3*				0*			
63	2.279E 02								
		0	1.632E 02	3	51	0	-9.415E 00	0	14
		1	1.632E 02	3	51	1	-5.560E 00	1	6
		2	1.560E 01	2	28	2	0.0		
		3	0.0			3	0.0		
		2*				0*			

TABLE 6 -- ENVELOPES OF MAXIMUM VALUES

STA	DIST X (FT)	MAX + MOM (FT-K)	MAX - MOM (FT-K)	MAX + SHEAR (K)	MAX - SHEAR (K)
-1	-5.774E-01	0.0	0.0	0.0	0.0
0	0.0	0.0	0.0	0.0	0.0
1	5.774E-01	0.0	0.0	0.0	0.0
2	1.155E 00	0.0	0.0	9.859E-13	-2.887E-12
3	1.732E 00	1.138E-12	-3.334E-12	0.0	-1.637E-01
4	2.309E 00	0.0	-1.890E-01	0.0	-6.547E-01
5	2.887E 00	0.0	-7.560E-01	0.0	-1.309E 00
6	3.464E 00	0.0	-1.701E 00	0.0	-1.964E 00
7	4.041E 00	0.0	-3.024E 00	0.0	-1.175E 02
8	4.619E 00	0.0	-1.374E 02	0.0	-2.331E 02
9	5.196E 00	0.0	-2.722E 02	0.0	-2.337E 02
10	5.774E 00	0.0	-4.073E 02	0.0	-2.344E 02
11	6.351E 00	0.0	-5.428E 02	9.192E 00	-3.948E 01
12	6.928E 00	0.0	-4.529E 02	1.782E 02	0.0
13	7.506E 00	0.0	-3.633E 02	1.775E 02	0.0
14	8.083E 00	0.0	-2.742E 02	1.768E 02	0.0
15	8.660E 00	3.943E 01	-1.854E 02	1.762E 02	0.0
16	9.238E 00	1.280E 02	-9.698E 01	1.755E 02	0.0
17	9.815E 00	2.170E 02	-8.948E 00	1.749E 02	0.0
18	1.039E 01	3.065E 02	0.0	1.742E 02	0.0
19	1.097E 01	3.959E 02	0.0	1.388E 02	0.0
20	1.155E 01	4.458E 02	0.0	1.033E 02	0.0
21	1.212E 01	4.953E 02	0.0	1.027E 02	0.0
22	1.270E 01	5.445E 02	0.0	1.752E 01	-1.190E 01
23	1.328E 01	4.955E 02	0.0	0.0	-8.534E 01
24	1.386E 01	4.460E 02	0.0	0.0	-8.600E 01
25	1.443E 01	3.962E 02	0.0	0.0	-8.665E 01
26	1.501E 01	3.460E 02	0.0	0.0	-8.731E 01
27	1.559E 01	2.955E 02	0.0	0.0	-8.796E 01
28	1.617E 01	2.445E 02	0.0	0.0	-8.862E 01
29	1.674E 01	1.932E 02	-2.204E 01	0.0	-8.927E 01
30	1.732E 01	1.415E 02	-4.690E 01	0.0	-8.993E 01
31	1.790E 01	8.946E 01	-7.214E 01	0.0	-1.254E 02
32	1.848E 01	0.0	-1.379E 02	0.0	-1.608E 02
33	1.905E 01	0.0	-2.041E 02	0.0	-1.615E 02
34	1.963E 01	0.0	-2.745E 02	0.0	-1.621E 02
35	2.021E 01	0.0	-3.665E 02	0.0	-1.628E 02
36	2.078E 01	0.0	-4.588E 02	0.0	-1.635E 02
37	2.136E 01	0.0	-5.522E 02	2.327E 01	-2.327E 01
38	2.194E 01	0.0	-4.607E 02	1.635E 02	0.0
39	2.252E 01	0.0	-3.696E 02	1.628E 02	0.0
40	2.309E 01	0.0	-2.789E 02	1.621E 02	0.0
41	2.367E 01	0.0	-2.041E 02	1.615E 02	0.0
42	2.425E 01	0.0	-1.379E 02	1.608E 02	0.0
43	2.483E 01	8.946E 01	-7.214E 01	1.254E 02	0.0
44	2.540E 01	1.415E 02	-4.690E 01	8.993E 01	0.0
45	2.598E 01	1.932E 02	-2.204E 01	8.927E 01	0.0
46	2.656E 01	2.445E 02	0.0	8.862E 01	0.0
47	2.714E 01	2.955E 02	0.0	8.796E 01	0.0
48	2.771E 01	3.460E 02	0.0	8.731E 01	0.0
49	2.829E 01	3.962E 02	0.0	8.665E 01	0.0
50	2.887E 01	4.460E 02	0.0	8.600E 01	0.0
51	2.944E 01	4.955E 02	0.0	8.534E 01	0.0
52	3.002E 01	5.445E 02	0.0	1.190E 01	-1.752E 01
53	3.060E 01	4.953E 02	0.0	0.0	-1.027E 02
54	3.118E 01	4.458E 02	0.0	0.0	-1.033E 02
55	3.175E 01	3.959E 02	0.0	0.0	-1.388E 02

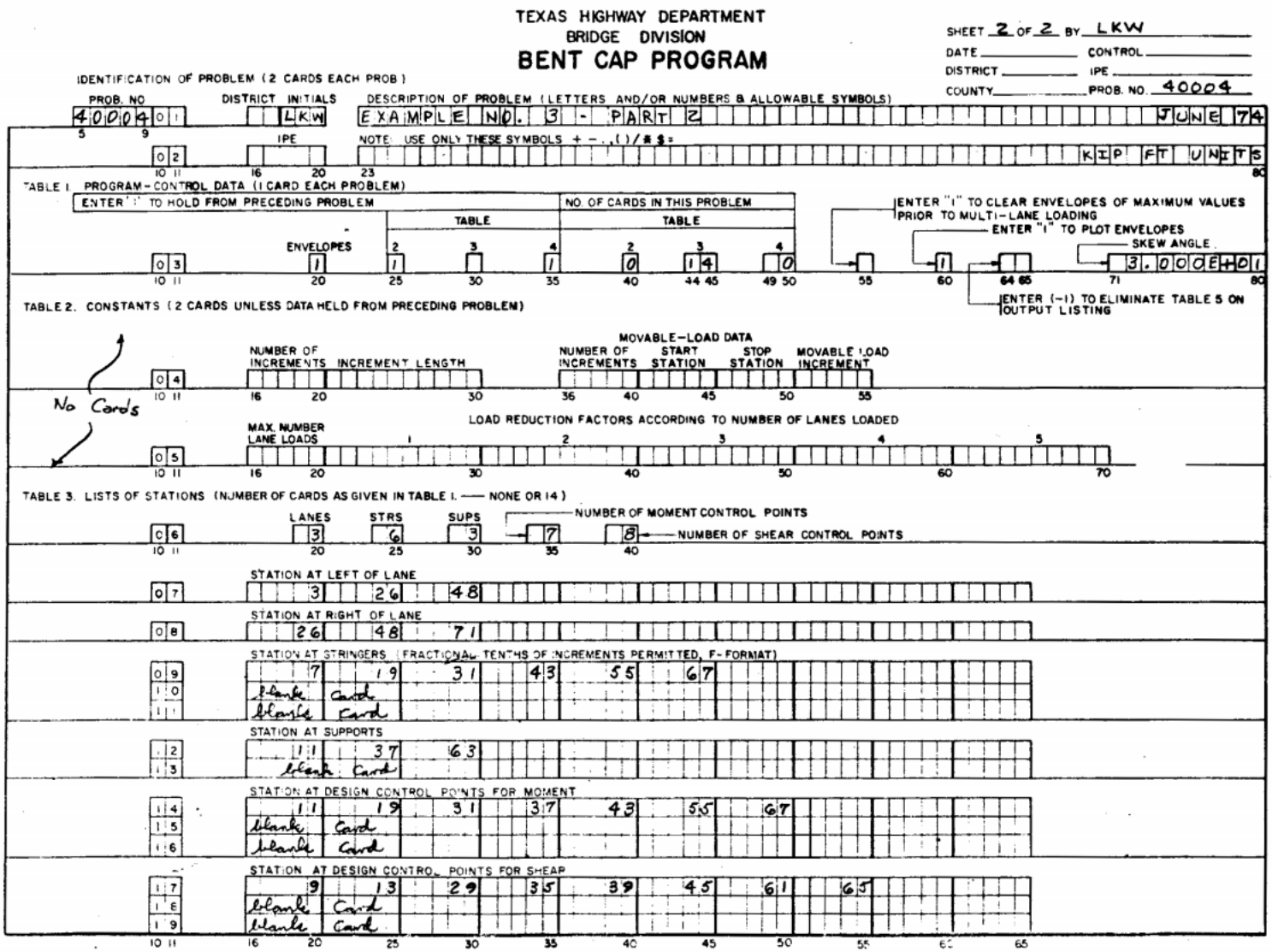
56	3.233E 01	3.065E 02	0.0	0.0	-1.742E 02
57	3.291E 01	2.170E 02	-8.948E 00	0.0	-1.749E 02
58	3.349E 01	1.280E 02	-9.698E 01	0.0	-1.755E 02
59	3.406E 01	3.943E 01	-1.854E 02	0.0	-1.762E 02
60	3.464E 01	0.0	-2.742E 02	0.0	-1.768E 02
61	3.522E 01	0.0	-3.633E 02	0.0	-1.775E 02
62	3.580E 01	0.0	-4.529E 02	0.0	-1.782E 02
63	3.637E 01	0.0	-5.428E 02	3.948E 01	-9.192E 00
64	3.695E 01	0.0	-4.073E 02	2.344E 02	0.0
65	3.753E 01	0.0	-2.722E 02	2.337E 02	0.0
66	3.811E 01	0.0	-1.374E 02	2.331E 02	0.0
67	3.868E 01	0.0	-3.024E 00	1.175E 02	0.0
68	3.926E 01	0.0	-1.701E 00	1.964E 00	0.0
69	3.984E 01	0.0	-7.560E-01	1.309E 00	0.0
70	4.041E 01	0.0	-1.890E-01	6.547E-01	0.0
71	4.099E 01	1.301E-12	-1.545E-12	1.637E-01	0.0
72	4.157E 01	0.0	0.0	1.338E-12	-1.127E-12
73	4.215E 01	0.0	0.0	0.0	0.0
74	4.272E 01	0.0	0.0	0.0	0.0
75	4.330E 01	0.0	0.0	0.0	0.0

TABLE 7 -- MAXIMUM SUPPORT REACTIONS

STA	DIST X FT	MAX + REACT K	MAX - REACT K
11	6.351E 00	4.067E 02	0.0
37	2.136E 01	4.902E 02	0.0
63	3.637E 01	4.067E 02	0.0

TABLE 8 -- SCALES FOR PLOT OUTPUT

NO PLOTS SPECIFIED FOR PROBLEM, 40003


TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION
BENT CAP PROGRAM
SHEET 2 OF 2 BY LKW
DATE
CONTROL
DISTRICT
IPE
COUNTY
PROB. NO. 40004
IDENTIFICATION OF PROBLEM (2 CARDS EACH PROB.)
PROB. NO
DISTRICT INITIALS
DESCRIPTION OF PROBLEM (LETTERS AND/OR NUMBERS & ALLOWABLE SYMBOLS)
40004 01
LKW
EXAMPLE NO. 3 - PART 2
JUNE 74
IPE
NOTE: USE ONLY THESE SYMBOLS + - . ( ) / # $ =
02
KIP FT UNITS
TABLE 1. PROGRAM-CONTROL DATA (1 CARD EACH PROBLEM)
ENTER "1" TO HOLD FROM PRECEDING PROBLEM
NO. OF CARDS IN THIS PROBLEM
TABLE
ENVELOPES
2
3
4
ENTER "1" TO CLEAR ENVELOPES OF MAXIMUM VALUES PRIOR TO MULTI-LANE LOADING
ENTER "1" TO PLOT ENVELOPES
SKEW ANGLE
03
1
1
1
0
14
0
1
1
3.0000E+01
ENTER (-1) TO ELIMINATE TABLE 5 ON OUTPUT LISTING
TABLE 2. CONSTANTS (2 CARDS UNLESS DATA HELD FROM PRECEDING PROBLEM)
NUMBER OF INCREMENTS
INCREMENT LENGTH
MOVABLE-LOAD DATA
NUMBER OF INCREMENTS
START STATION
STOP STATION
MOVABLE LOAD INCREMENT
04
No Cards
MAX. NUMBER LANE LOADS
LOAD REDUCTION FACTORS ACCORDING TO NUMBER OF LANES LOADED
1
2
3
4
5
05
TABLE 3. LISTS OF STATIONS (NUMBER OF CARDS AS GIVEN IN TABLE 1. — NONE OR 14)
LANES
STRS
SUPS
NUMBER OF MOMENT CONTROL POINTS
NUMBER OF SHEAR CONTROL POINTS
06
3
6
3
7
8
STATION AT LEFT OF LANE
07
3
26
48
STATION AT RIGHT OF LANE
08
26
48
71
STATION AT STRINGERS (FRACTIONAL TENTHS OF INCREMENTS PERMITTED, F-FORMAT)
09
7
19
31
43
55
67
10
blank
Card
11
blank
Card
STATION AT SUPPORTS
12
11
37
63
13
blank
Card
STATION AT DESIGN CONTROL POINTS FOR MOMENT
14
11
19
31
37
43
55
67
15
blank
Card
16
blank
Card
STATION AT DESIGN CONTROL POINTS FOR SHEAR
17
9
13
29
35
39
45
61
65
18
blank
Card
19
blank
Card

File 5.29-1

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

BENT CAP PROGRAM (CONT'D)

TABLE 4

STIFFNESS AND LOAD DATA (NUMBER OF CARDS AS GIVEN IN TABLE I. ALL DATA ADDED TO STORAGE)

PROBLEM NUMBER	FIXED OR MOVABLE STATION FROM	STATION TO	CONTINUED IF=1	FIXED-POSITION DATA: BENDING-STIFFNESS OF CAP	SIDEWALK & SLAB LOADS	STRINGER & CAP LOADS	MOVABLE POSITION SLAB LOADS	REMARKS
4002A								
No Cards								

5 9 — 10 11 — 16 — 20 — 25 — 30 — 40 — 50 — 60 — 70

File 5.29-2

PROGRAM CAP 17 - DECK THD - MATLOCK,WBI,FE,JJP REVISION DATE # 12 JUN 68

PROB
40004 LKW EXAMPLE NO. 3 - PART 2 JUNE 74
KIP FT UNITS

TABLE 1 -- PROGRAM-CONTROL DATA

	ENVELOPES OF MAXIMUMS	TABLE NUMBER 2	3	4
OPTIONS TO HOLD (IF=1) FROM PRECEDING PROB	1	1	0	1
NUMBER OF ADDITIONAL CARDS FOR CURRENT PROB		0	14	0
OPTION (IF=1) TO CLEAR ENVELOPES BEFORE LANE LOADINGS				0
OPTION (IF=1) TO PLOT DESIGN VARIABLE ENVELOPES				1
OPTION (IF=-1)TO OMIT OUTPUT TABLE 5				0
ANGLE OF SKEW, DEGREES			3.000E 01	

TABLE 2 -- CONSTANTS

USING DATA FROM THE PREVIOUS PROBLEM

TABLE 3 -- LISTS OF STATIONS

	NUM OF LANES	NUM OF STRINGERS	NUM OF SUPPORTS	NUM MOM CONTR PTS	NUM SHEAR CONTR PTS
TOTAL	3	6	3	7	8

	1	2	3	4	5	6	7	8	9	10
LANE LEFT	3	26	48							
LANE RIGHT	26	48	71							
STRINGERS	7.0	19.0	31.0	43.0	55.0	67.0				
SUPPORTS	11	37	63							
MOM CONTR	11	19	31	37	43	55	67			
SHEAR CONTR	9	13	29	35	39	45	61	65		

TABLE 4 -- CAP STIFFNESS, AND DATA FOR BOTH FIXED AND MOVABLE LOADS

USING DATA FROM THE PREVIOUS PROBLEM PLUS

NONE

TABLE 4A -- DEAD LOAD DEFLECTIONS

STA	DIST X (FT)	DEFLECTION (FT)
-1	-5.774E-01	0.0
0	0.0	0.0
1	5.774E-01	0.0
2	1.155E 00	-8.489D-04
3	1.732E 00	-7.261D-04
4	2.309E 00	-6.033D-04
5	2.887E 00	-4.806D-04
6	3.464E 00	-3.581D-04
7	4.041E 00	-2.362D-04
8	4.619E 00	-1.153D-04
9	5.196E 00	-1.953D-05
10	5.774E 00	2.703D-05
11	6.351E 00	0.0
12	6.928E 00	-1.251D-04
13	7.506E 00	-3.288D-04
14	8.083E 00	-5.922D-04
15	8.660E 00	-8.961D-04
16	9.238E 00	-1.222D-03
17	9.815E 00	-1.550D-03
18	1.039E 01	-1.862D-03
19	1.097E 01	-2.1[illegible]
20	1.155E 01	[illegible]
21	1.212E 01	
22	1.270E 01	
23	1.328E 01	
24	1.386E 01	
25	1.[illegible]	
26		
27		
28		

Results same as Prob 40003

		-03
		-0D-03
		-.222D-03
		-8.961D-04
		-5.922D-04
		-3.288D-04
	[illegible]E 01	-1.251D-04
	[illegible].637E 01	0.0
	3.695E 01	2.703D-05
	3.753E 01	-1.953D-05
66	3.811E 01	-1.153D-04
67	3.868E 01	-2.362D-04
68	3.926E 01	-3.581D-04
69	3.984E 01	-4.806D-04
70	4.041E 01	-6.033D-04
71	4.099E 01	-7.261D-04
72	4.157E 01	-8.489D-04
73	4.215E 01	0.0
74	4.272E 01	0.0
75	4.330E 01	0.0

PROB (CONTD)
40004 LKW EXAMPLE NO. 3 - PART 2 JUNE 74
KIP FT UNITS

TABLE 5 -- MULTI-LANE LOADING SUMMARY (*--CRITICAL NUMBER OF LANE LOADS)

MOMENT (FT-K)

AT STA	DEAD LD EFFECT	LANE ORDER	POSITIVE MAXIMUM	LOAD AT LANE	LOAD AT STA	LANE ORDER	NEGATIVE MAXIMUM	LOAD AT LANE	LOAD AT STA
11	-2.941E 02								
		0	0.0			0	-2.205E 02	1	3
		1	0.0			1	-2.205E 02	1	3
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		0*				0*			
19	1.583E 02								
		0	3.000E 02	0	13	0	-5.261E 01	0	40
		1	2.043E 02	1	6	1	-2.685E 01	3	48
		2	6.046E 01	2	26	2	0.0		
		3	0.0			3	0.0		
		0*				0*			
31	3.658E 01								
		0	1.722E 02	0	18	0	-1.315E 02	0	40
		1	8.657E 01	2	26	1	-6.714E 01	3	48
		2	5.211E 01	1	6	2	0.0		
		3	0.0			3	0.0		
		0*				0*			
37	-3.313E 02								
		0	0.0			0	-2.092E 02	2	27
		1	0.0			1	-2.092E 02	2	27
		2	0.0			2	-8.728E 01	1	6
		3	0.0			3	-8.728E 01	3	48
		0*				3*			
43	3.658E 01								
		0	1.722E 02	0	36	0	-1.315E 02	0	14
		1	8.657E 01	2	28	1	-6.714E 01	1	6
		2	5.211E 01	3	48	2	0.0		
		3	0.0			3	0.0		
		0*				0*			
55	1.583E 02								
		0	3.000E 02	0	41	0	-5.261E 01	0	14
		1	2.043E 02	3	48	1	-2.685E 01	1	6
		2	6.046E 01	2	28	2	0.0		
		3	0.0			3	0.0		
		0*				0*			
67	-3.024E 00								
		0	0.0			0	0.0		
		1	0.0			1	0.0		
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		0*				0*			

SHEAR (K)

AT STA	DEAD LD EFFECT	LANE ORDER	POSITIVE MAXIMUM	LOAD AT LANE	LOAD AT STA	LANE ORDER	NEGATIVE MAXIMUM	LOAD AT LANE	LOAD AT STA
9	-1.260E 02								
		0	0.0			0	-9.547E 01	1	3
		1	0.0			1	-9.547E 01	1	3
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		0*				0*			
13	9.926E 01								
		0	7.787E 01	0	9	0	-1.139E 01	0	40
		1	7.574E 01	1	6	1	-5.814E 00	3	48
		2	1.309E 01	2	26	2	0.0		
		3	0.0			3	0.0		
		2*				0*			
29	-3.332E 01								
		0	3.768E 00	2	26	0	-2.655E 01	0	9
		1	3.768E 00	2	26	1	-2.196E 01	1	6
		2	0.0			2	-5.814E 00	3	48
		3	0.0			3	0.0		
		0*				2*			
35	-1.068E 02								
		0	0.0			0	-1.081E 02	0	19
		1	0.0			1	-8.536E 01	2	26
		2	0.0			2	-4.024E 01	1	6
		3	0.0			3	-5.814E 00	3	48
		0*				2*			
39	1.068E 02								
		0	1.081E 02	0	35	0	0.0		
		1	8.536E 01	2	28	1	0.0		
		2	4.024E 01	3	48	2	0.0		
		3	5.814E 00	1	6	3	0.0		
		2*				0*			
45	3.332E 01								
		0	2.655E 01	0	45	0	-3.768E 00	2	28
		1	2.196E 01	3	48	1	-3.768E 00	2	28
		2	5.814E 00	1	6	2	0.0		
		3	0.0			3	0.0		
		2*				0*			
61	-9.926E 01								
		0	1.139E 01	0	14	0	-7.787E 01	0	45
		1	5.814E 00	1	6	1	-7.574E 01	3	48
		2	0.0			2	-1.309E 01	2	28
		3	0.0			3	0.0		
		0*				2*			
65	1.260E 02								
		0	9.547E 01	3	51	0	0.0		
		1	9.547E 01	3	51	1	0.0		
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		0*				0*			

REACTION (K)

AT	DEAD LD	LANE	POSITIVE	LOAD AT	LANE	NEGATIVE	LOAD AT

STA	EFFECT	ORDER	MAXIMUM	LANE	STA	ORDER	MAXIMUM	LANE	STA
11	2.279E 02								
		0	1.630E 02	1	3	0	-1.139E 01	0	40
		1	1.630E 02	1	3	1	-5.814E 00	3	48
		2	1.309E 01	2	26	2	0.0		
		3	0.0			3	0.0		
		2*				0*			
37	2.688E 02								
		0	1.601E 02	2	27	0	0.0		
		1	1.601E 02	2	27	1	0.0		
		2	4.605E 01	1	6	2	0.0		
		3	4.605E 01	3	48	3	0.0		
		3*				0*			
63	2.279E 02								
		0	1.630E 02	3	51	0	-1.139E 01	0	14
		1	1.630E 02	3	51	1	-5.814E 00	1	6
		2	1.309E 01	2	28	2	0.0		
		3	0.0			3	0.0		
		2*				0*			

Reaction Calculation at Station 63

Dead Load	= 227.9
Lane 3 Live Load @ 100%	= 163.0
Lane 2 Live Load @ 100%	= 13.09
	403.99
	404.0

Since envelopes were held from the previous problem and the value from this problem is smaller, the value from the previous problem (406.7) appears in the envelope for this problem. The 404.0 is discarded.

TABLE 6 -- ENVELOPES OF MAXIMUM VALUES

STA	DIST X (FT)	MAX + MOM (FT-K)	MAX - MOM (FT-K)	MAX + SHEAR (K)	MAX - SHEAR (K)
-1	-5.774E-01	0.0	0.0	0.0	0.0
0	0.0	0.0	0.0	0.0	0.0
1	5.774E-01	0.0	0.0	0.0	0.0
2	1.155E 00	0.0	0.0	9.859E-13	-2.887E-12
3	1.732E 00	1.138E-12	-3.334E-12	0.0	-1.637E-01
4	2.309E 00	0.0	-1.890E-01	0.0	-6.547E-01
5	2.887E 00	0.0	-7.560E-01	0.0	-1.309E 00
6	3.464E 00	0.0	-1.701E 00	0.0	-1.964E 00
7	4.041E 00	0.0	-3.024E 00	0.0	-1.175E 02
8	4.619E 00	0.0	-1.374E 02	0.0	-2.331E 02
9	5.196E 00	0.0	-2.722E 02	0.0	-2.337E 02
10	5.774E 00	0.0	-4.073E 02	0.0	-2.344E 02
11	6.351E 00	0.0	-5.428E 02	1.635E 01	-3.948E 01
12	6.928E 00	0.0	-4.529E 02	1.887E 02	0.0
13	7.506E 00	0.0	-3.633E 02	1.881E 02	0.0
14	8.083E 00	0.0	-2.742E 02	1.874E 02	0.0
15	8.660E 00	7.248E 01	-1.854E 02	1.868E 02	0.0
16	9.238E 00	1.686E 02	-9.698E 01	1.861E 02	0.0
17	9.815E 00	2.647E 02	-8.948E 00	1.855E 02	0.0
18	1.039E 01	3.617E 02	0.0	1.848E 02	0.0
19	1.097E 01	4.583E 02	0.0	1.388E 02	0.0
20	1.155E 01	4.601E 02	0.0	1.033E 02	-2.704E 00
21	1.212E 01	4.953E 02	0.0	1.027E 02	-3.358E 00
22	1.270E 01	5.445E 02	0.0	1.752E 01	-3.026E 01
23	1.328E 01	4.955E 02	0.0	0.0	-8.534E 01
24	1.386E 01	4.460E 02	0.0	0.0	-8.600E 01
25	1.443E 01	3.962E 02	0.0	0.0	-8.665E 01
26	1.501E 01	3.470E 02	0.0	0.0	-8.731E 01
27	1.559E 01	3.182E 02	0.0	0.0	-8.796E 01
28	1.617E 01	2.902E 02	-1.694E 01	0.0	-8.862E 01
29	1.674E 01	2.621E 02	-4.256E 01	0.0	-8.927E 01
30	1.732E 01	2.352E 02	-6.856E 01	0.0	-8.993E 01
31	1.790E 01	2.088E 02	-9.494E 01	0.0	-1.413E 02
32	1.848E 01	8.610E 01	-1.638E 02	0.0	-2.305E 02
33	1.905E 01	0.0	-2.340E 02	0.0	-2.311E 02
34	1.963E 01	0.0	-3.054E 02	0.0	-2.318E 02
35	2.021E 01	0.0	-4.215E 02	0.0	-2.324E 02
36	2.078E 01	0.0	-5.489E 02	0.0	-2.331E 02
37	2.136E 01	0.0	-6.767E 02	4.231E 01	-4.231E 01
38	2.194E 01	0.0	-5.489E 02	2.331E 02	0.0
39	2.252E 01	0.0	-4.215E 02	2.324E 02	0.0
40	2.309E 01	0.0	-3.054E 02	2.318E 02	0.0
41	2.367E 01	0.0	-2.340E 02	2.311E 02	0.0
42	2.425E 01	8.610E 01	-1.638E 02	2.305E 02	0.0
43	2.483E 01	2.088E 02	-9.494E 01	1.413E 02	0.0
44	2.540E 01	2.352E 02	-6.856E 01	8.993E 01	0.0
45	2.598E 01	2.621E 02	-4.256E 01	8.927E 01	0.0
46	2.656E 01	2.902E 02	-1.694E 01	8.862E 01	0.0
47	2.714E 01	3.182E 02	0.0	8.796E 01	0.0
48	2.771E 01	3.470E 02	0.0	8.731E 01	0.0
49	2.829E 01	3.962E 02	0.0	8.665E 01	0.0
50	2.887E 01	4.460E 02	0.0	8.600E 01	0.0
51	2.944E 01	4.955E 02	0.0	8.534E 01	0.0
52	3.002E 01	5.445E 02	0.0	3.026E 01	-1.752E 01
53	3.060E 01	4.953E 02	0.0	3.358E 00	-1.027E 02
54	3.118E 01	4.601E 02	0.0	2.704E 00	-1.033E 02
55	3.175E 01	4.583E 02	0.0	0.0	-1.388E 02

56	3.233E 01	3.617E 02	0.0	0.0	-1.848E 02
57	3.291E 01	2.647E 02	-8.948E 00	0.0	-1.855E 02
58	3.349E 01	1.686E 02	-9.698E 01	0.0	-1.861E 02
59	3.406E 01	7.248E 01	-1.854E 02	0.0	-1.868E 02
60	3.464E 01	0.0	-2.742E 02	0.0	-1.874E 02
61	3.522E 01	0.0	-3.633E 02	0.0	-1.881E 02
62	3.580E 01	0.0	-4.529E 02	0.0	-1.887E 02
63	3.637E 01	0.0	-5.428E 02	3.948E 01	-1.635E 01
64	3.695E 01	0.0	-4.073E 02	2.344E 02	0.0
65	3.753E 01	0.0	-2.722E 02	2.337E 02	0.0
66	3.811E 01	0.0	-1.374E 02	2.331E 02	0.0
67	3.868E 01	0.0	-3.024E 00	1.175E 02	0.0
68	3.926E 01	0.0	-1.701E 00	1.964E 00	0.0
69	3.984E 01	0.0	-7.560E-01	1.309E 00	0.0
70	4.041E 01	0.0	-1.890E-01	6.547E-01	0.0
71	4.099E 01	1.301E-12	-2.602E-12	1.637E-01	0.0
72	4.157E 01	0.0	0.0	2.253E-12	-1.127E-12
73	4.215E 01	0.0	0.0	0.0	0.0
74	4.272E 01	0.0	0.0	0.0	0.0
75	4.330E 01	0.0	0.0	0.0	0.0

The values enclosed by brackets above are the same as those in Part 1 and have been held from Part 1. The remaining values are larger than those from Part 1 and are the result of calculations made for Part 2.

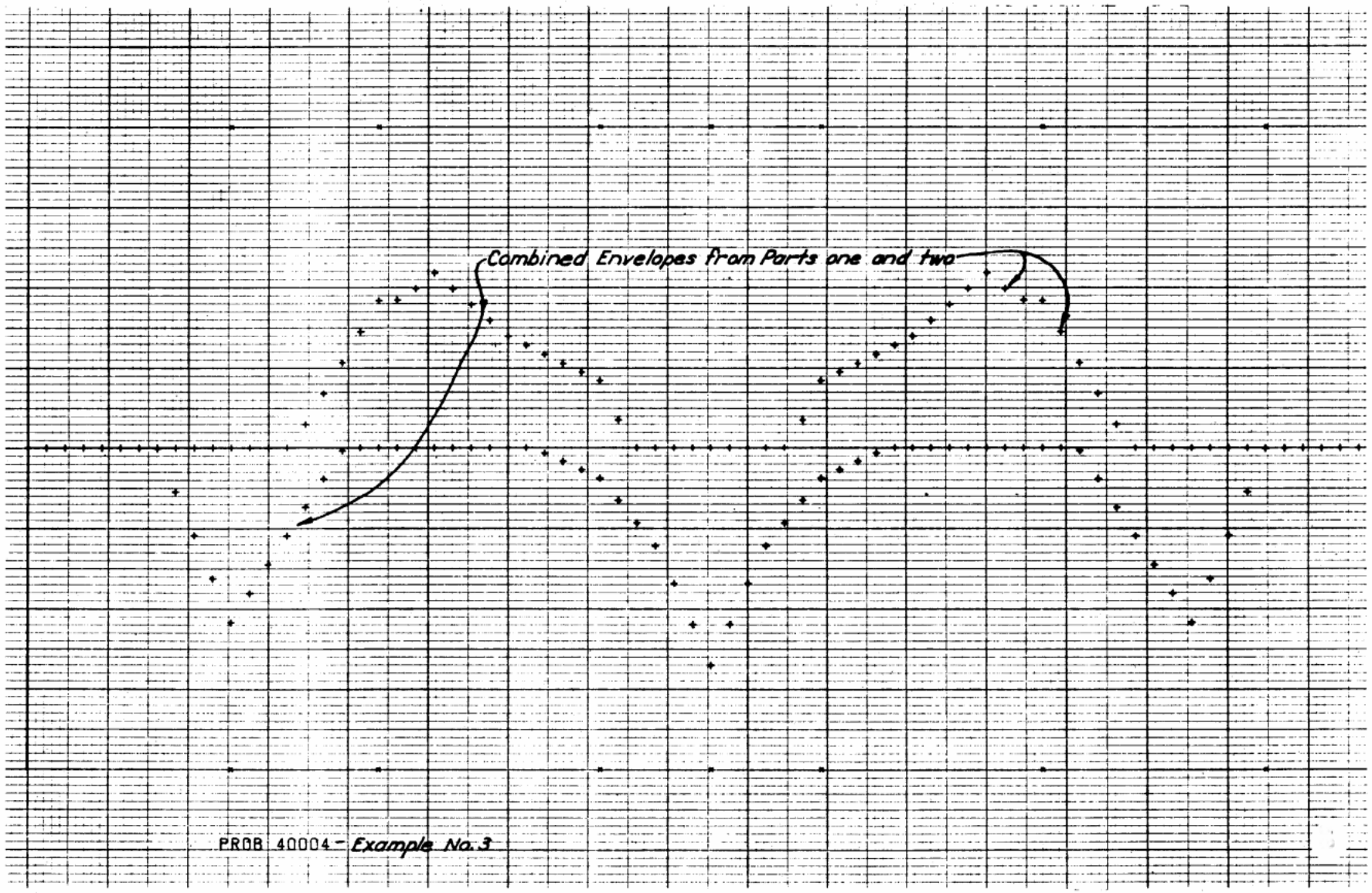
TABLE 7 -- MAXIMUM SUPPORT REACTIONS

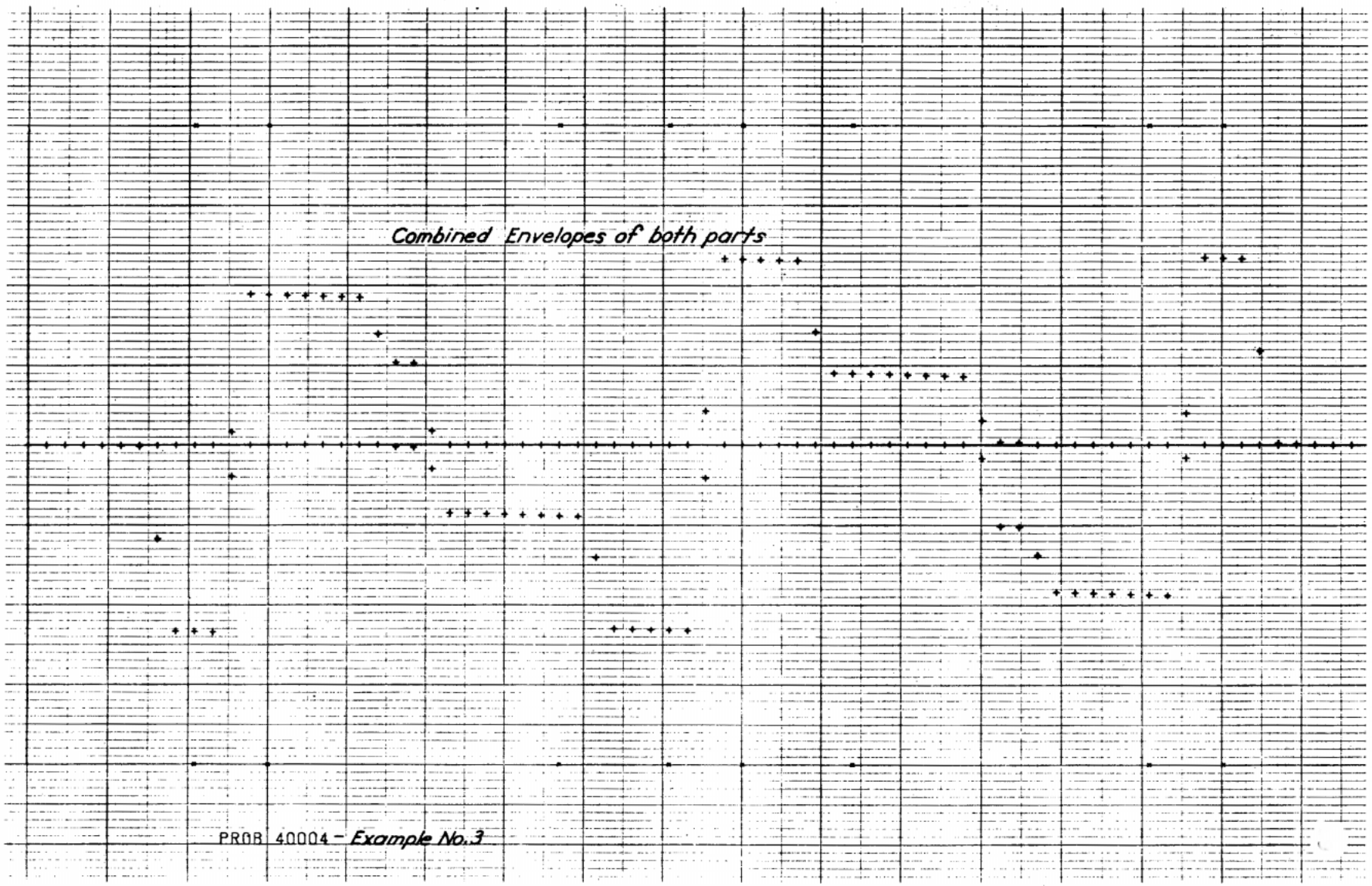
STA	DIST X FT	MAX + REACT K	MAX - REACT K
11	6.351E 00	4.067E 02	0.0
37	2.136E 01	4.958E 02	0.0
63	3.637E 01	4.067E 02	0.0

Held from previous problem (Part 1).

TABLE 8 -- SCALES FOR PLOT OUTPUT

DISTANCE	20. INCHES =	50.	FT
MOMENT	4. INCHES =	1000.	FT-K
SHEAR	4. INCHES =	400.	K


Combined Envelopes from Parts one and two
PROB 40004 - Example No. 3


Combined Envelopes of both parts
PROB 40004 – Example No. 3

EXAMPLE NO. 4 - A ONE COLUMN BENT (PROBS 40005 AND 40006)

This example shows bow a normal one column bent under 2-25′ simple slab spans can be solved with the Bent Cap Program. The description of this type of bent in stations is no different from a slab and stringer unit except that there are no stringers. Tables 1 and 2 are unaffected but in Table 3, Cards 09, 10 and 11 describing stringer location must be left blank and so must the stringer count in Card 06. Since the program cannot solve a cap with only one support, the single column is represented by two dummy supports, one near each edge of the real column, located as shown in the sketch and calculations for this example. The remainder of Table 3 is filled out in the usual manner. Since this bent is so simple there is a temptation to omit control points. If this is done for moment, no multi-lane moment loading will be done and if no shear control points are specified no multi-lane shear loading will be done.

The input data for Table 4 has been complicated by the cantilever sidewalks. Since no loads may be input to the cap where the cap is undefined, the sidewalk loadings must be approximated by loading applied within the defined cap. The procedure chosen for this example is to transfer the shear forces generated in the sidewalk slab directly into the ends of the cap.

The moments generated in the sidewalk slab are assumed to be absorbed in the roadway slab as the design circumstances require anyway. Part one of this Example, Problem 40005, investigates the cap with the varying bent stiffness and weight and the usual design loadings for dead load, live load, and sidewalk live load.

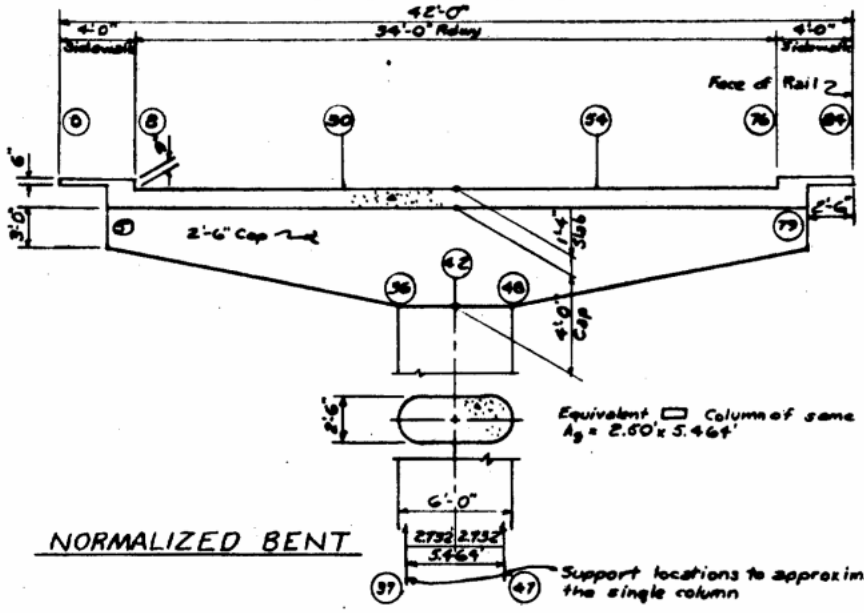
In part two, Problem 40006, the effect of a truck displaced out onto the sidewalk is investigated. The envelopes and Tables 1, 2, 3 and 4 are all held and Table 4 adjusted to the new loading by algebraic addition of additional data. Although only loads have been changed, stiffnesses can also be modified in this way. The first three cards are entered in Table 4 to cancel the sidewalk and vehicular live loads, being equal in magnitude and opposite in direction and at the same stations. The last two cards are the ultimate live load lane reaction without impact and at 150% of “allowable stresses” (load factor reduced by two-thirds) in accordance with AASHTO (1973) Article 1.3.2(B). Since envelopes have been held from the design load conditions, the final envelopes of this problem will then be expanded to include this overload condition for stations where and if it controls. The outside wheel on the sidewalk has been moved in to the end of cap but the other wheel has been left in the position it would occupy when the outside wheel is one foot from face of rail.

File 1284

DESIGN L.K.W. DATE 6-74
CK. DSN. ..... DATE .....
DESIGN FOR .....
Example No. 4 - Simple slabs on One column Bent

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

COUNTY .....
CONTROL .....
I.P.E. .....
HIGHWAY .....
SHEET ..... OF .....



NORMALIZED BENT

Input Data Calculations:
Span lengths = 26' Each

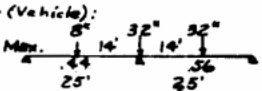
Use "6" Increments
No. of Increments = 84

Superstructure Dead Load:
W_{DL} = 1.333 x 25.0 x 0.150 = 5.00 K/ft.
Ult. W_{DL} = [1.30 x 5.00] + 2 = 3.250 E+00 K/Sta.

Sidewalk Dead Load: (Concentrated at Cap Ends)
W_{DL} = [4.0 x 0.5 + 0.25 x 1.5] x 0.150 x 25.0 = 8.91 K/ft.
Ult. W_{DL} = 1.30 x 8.91 = 11.58 K (Each end)

Live Load + Impact (Vehicle):

$I = \frac{50}{25+125} = 30\%$ Max.



LLR = 32(1+0.44) + 8 x 0.44 = 49.6 K/Lane
Ult. (LL+I)R = 1.3 x 1.30 x 6/6 x 49.6 = 139.7
= 139.7 ÷ 20 = 6.985 K/Sta.

Live Load (Pedestrian, Concentrated at Cap Ends)
W_{LL} = 0.085 ksf.
Bent Reaction = 0.085 x 4.0 x 25 = 8.5 K/Side
Ult. LL = 1.3 x 6/3 x 8.5 = 18.42 K/Side

Cap Data:
At ends:
Stiffness = $\frac{2.5 \times 3.0^3}{12} \times 3000 \times 144 = 2.43$ E+06
W_{DL} = 2.5 x 3.0 x 0.150 = 1.125 K/ft.
= 5.625 E-01 K/Sta.

At face of column:
Stiffness = $\frac{2.5 \times 4.0^3}{12} \times 3000 \times 144 = 1.01$ E+07
W_{DL} = 2.5 x 4.0 x 0.150 = 1.500 K/ft
= 7.500 E-01 K/Sta.

Sidewalk Overload [AASHO Art. 1.3.2(B)]:
(One lane, no impact, 150% Allowable)
LLR = $\frac{1.5 \times 6/3}{1.5} \times 49.6 = 71.64$ K/Lane
71.64 ÷ 2 = 35.8 K/Wheel located at Stas. (2) and (14). Move Wheel at Sta (2) to end of Cap at Sta. (3).

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

BENT CAP PROGRAM

SHEET 1 OF 2 BY LKW
DATE _____ CONTROL _____
DISTRICT _____ IPE _____
COUNTY _____ PROB. NO. 40005

IDENTIFICATION OF PROBLEM (2 CARDS EACH PROB.)

PROB. NO.	DISTRICT INITIALS	DESCRIPTION OF PROBLEM (LETTERS AND/OR NUMBERS & ALLOWABLE SYMBOLS)
40005 01	LKW	EXAMPLE NO. 4 ONE COL. BENT BETWEEN SLAB SPANS JUNE 74
02	IPE	NOTE: USE ONLY THESE SYMBOLS + - . , ( ) / # $ =
		PART ONE (DESIGN LOAD CONDITIONS) KIP FT UNITS

TABLE 1. PROGRAM-CONTROL DATA (1 CARD EACH PROBLEM)

ENTER "1" TO HOLD FROM PRECEDING PROBLEM		NO. OF CARDS IN THIS PROBLEM								
		TABLE			TABLE					
	ENVELOPES	2	3	4	2	3	4	ENTER "1" TO CLEAR ENVELOPES OF MAXIMUM VALUES PRIOR TO MULTI-LANE LOADING	ENTER "1" TO PLOT ENVELOPES	SKEW ANGLE
03					2	14	10			

ENTER (-1) TO ELIMINATE TABLE 5 ON OUTPUT LISTING

TABLE 2. CONSTANTS (2 CARDS UNLESS DATA HELD FROM PRECEDING PROBLEM)

	NUMBER OF INCREMENTS	INCREMENT LENGTH	MOVABLE-LOAD DATA: NUMBER OF INCREMENTS	START STATION	STOP STATION	MOVABLE LOAD INCREMENT
04	84	1.000E-01	20	8	56	2

	MAX. NUMBER LANE LOADS	LOAD REDUCTION FACTORS ACCORDING TO NUMBER OF LANES LOADED: 1	2	3	4	5
05	3	1.000E+00	1.000E+00	9.000E-01		

TABLE 3. LISTS OF STATIONS (NUMBER OF CARDS AS GIVEN IN TABLE 1. — NONE OR 14)

	LANES	STRS	SUPS	NUMBER OF MOMENT CONTROL POINTS	NUMBER OF SHEAR CONTROL POINTS
06	3		2	4	4

STATION AT LEFT OF LANE

07	8	31	54

STATION AT RIGHT OF LANE

08	31	54	76

STATION AT STRINGERS (FRACTIONAL TENTHS OF INCREMENTS PERMITTED, F-FORMAT)

09	blank	card
10	blank	card
11	blank	card

STATION AT SUPPORTS

12	37	47
13		

STATION AT DESIGN CONTROL POINTS FOR MOMENT

14	30	37	47	54
15	blank	card		
16	blank	card		

STATION AT DESIGN CONTROL POINTS FOR SHEAR

17	30	30	49	54
18	blank	card		
19	blank	card		

File 5.29-1

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

BENT CAP PROGRAM (CONT'D)

TABLE 4. STIFFNESS AND LOAD DATA (NUMBER OF CARDS AS GIVEN IN TABLE I. ALL DATA ADDED TO STORAGE)

PROBLEM NUMBER		FIXED OR MOVABLE STATION FROM	STATION TO	CONTINUED IF=1	FIXED-POSITION DATA: BENDING-STIFFNESS OF CAP	SIDEWALK & SLAB LOADS	STRINGER & CAP LOADS	MOVABLE POSITION SLAB LOADS	REMARKS
40005	20	5		1	2.450E+06		-5.625E-01		Cap properties
	21		36	1	1.010E+07		-7.500E-01		
	22		48	1	1.010E+07		-7.500E-01		
	23		79		2.430E+06		-5.625E-01		
	24	5	79				-3.250E+00		Rdwy D.L.
	25	5	5				-1.158E+01		Left sidewalk
	26	79	79				-1.158E+01		Right sidewalk
	27	5	5				-1.842E+01		Sidewalk
	28	79	79				-1.842E+01		live loads
	29	0	20					-6.985E+00	Vehicle (LL+I)
	30								
	31								
	32								
	33								
	34								
	35								
	36								
	37								
	38								
	39								
	40								
	41								
	42								
	43								
	44								
	45								
	46								
	47								
	48								
	49								
	50								
	51								
	52								
	53								
	54								
	55								
	56								
	57								

10 11 16 20 25 30 40 50 60 70

File 5.29-2

PROGRAM CAP 17 - DECK THD - MATLOCK,WBI,FE,JJP REVISION DATE # 12 JUN 68

PROB
40005 LKW EXAMPLE NO. 4 ONE COL. BENT BETWEEN SLAB SPANS JUNE 74
PART ONE (DESIGN LOAD CONDITIONS) KIP FT UNITS

TABLE 1 -- PROGRAM-CONTROL DATA

	ENVELOPES OF MAXIMUMS	TABLE NUMBER 2	3	4
OPTIONS TO HOLD (IF=1) FROM PRECEDING PROB	0	0	0	0
NUMBER OF ADDITIONAL CARDS FOR CURRENT PROB		2	14	10
OPTION (IF=1) TO CLEAR ENVELOPES BEFORE LANE LOADINGS				0
OPTION (IF=1) TO PLOT DESIGN VARIABLE ENVELOPES				0
OPTION (IF=-1)TO OMIT OUTPUT TABLE 5				0
ANGLE OF SKEW, DEGREES		0.0		

TABLE 2 -- CONSTANTS

NUMBER OF INCREMENTS FOR SLAB AND CAP	84
INCREMENT LENGTH, FT	5.000E-01
NUMBER OF INCREMENTS FOR MOVABLE LOAD	20
INITIAL POSITION OF MOVABLE-LOAD STA ZERO	8
FINAL POSITION OF MOVABLE LOAD STA ZERO	56
NUMBER OF INCREMENTS BETWEEN EACH POSITION OF MOVABLE LOAD	2
MAXIMUM NUMBER OF LANES TO BE LOADED SIMULTANEOUSLY	3

LIST OF LOAD COEFFICIENTS CORRESPONDING TO NUMBER OF LANES LOADED

1	2	3	4	5
1.000E 00	1.000E 00	9.000E-01		

TABLE 3 -- LISTS OF STATIONS

	NUM OF LANES	NUM OF STRINGERS	NUM OF SUPPORTS	NUM MOM CONTR PTS	NUM SHEAR CONTR PTS
TOTAL	3	0	2	4	4

	1	2	3	4	5	6	7	8	9	10
LANE LEFT	8	31	54							
LANE RIGHT	31	54	76							
SUPPORTS	37	47								
MOM CONTR	30	37	47	54						
SHEAR CONTR	30	35	49	54						

TABLE 4 -- CAP STIFFNESS, AND DATA FOR BOTH FIXED AND MOVABLE LOADS

FIXED-OR-MOVABLE STA FROM	STA TO	CONTD IF=1	FIXED-POSITION DATA - - - - - CAP BENDING STIFFNESS (K-FT*FT)	SIDEWALK, SLAB LOADS (K)	STRINGER, CAP LOADS (K)	MOVABLE-POSITION SLAB LOADS (K)
5		1	2.430E 06	0.0	-5.625E-01	0.0
	36	1	1.010E 07	0.0	-7.500E-01	0.0
	48	1	1.010E 07	0.0	-7.500E-01	0.0
	79	0	2.430E 06	0.0	-5.625E-01	0.0
5	79	0	0.0	0.0	-3.250E 00	0.0
5	5	0	0.0	0.0	-1.158E 01	0.0
79	79	0	0.0	0.0	-1.158E 01	0.0
5	5	0	0.0	0.0	-1.842E 01	0.0
79	79	0	0.0	0.0	-1.842E 01	0.0
0	20	0	0.0	0.0	0.0	-6.985E 00

TABLE 4A -- DEAD LOAD DEFLECTIONS

STA	DIST X (FT)	DEFLECTION (FT)
-1	-5.000E-01	0.0
0	0.0	0.0
1	5.000E-01	0.0
2	1.000E 00	0.0
3	1.500E 00	0.0
4	2.000E 00	-1.910D-02
5	2.500E 00	-1.832D-02
6	3.000E 00	-1.754D-02
7	3.500E 00	-1.677D-02
8	4.000E 00	-1.599D-02
9	4.500E 00	-1.522D-02
10	5.000E 00	-1.446D-02
11	5.500E 00	-1.370D-02
12	6.000E 00	-1.295D-02
13	6.500E 00	-1.221D-02
14	7.000E 00	-1.148D-02
15	7.500E 00	-1.076D-02
16	8.000E 00	-1.005D-02
17	8.500E 00	-9.360D-03
18	9.000E 00	-8.681D-03
19	9.500E 00	-8.019D-03
20	1.000E 01	-7.373D-03
21	1.050E 01	-6.746D-03
22	1.100E 01	-6.137D-03
23	1.150E 01	-5.548D-03
24	1.200E 01	-4.981D-03
25	1.250E 01	-4.436D-03
26	1.300E 01	-3.914D-03
27	1.350E 01	-3.416D-03
28	1.400E 01	-2.944D-03
29	1.450E 01	-2.497D-03
30	1.500E 01	-2.079D-03
31	1.550E 01	-1.688D-03
32	1.600E 01	-1.327D-03
33	1.650E 01	-9.969D-04
34	1.700E 01	-6.979D-04
35	1.750E 01	-4.314D-04
36	1.800E 01	-1.984D-04
37	1.850E 01	0.0
38	1.900E 01	1.620D-04
39	1.950E 01	2.877D-04
40	2.000E 01	3.774D-04
41	2.050E 01	4.312D-04
42	2.100E 01	4.491D-04
43	2.150E 01	4.312D-04
44	2.200E 01	3.774D-04
45	2.250E 01	2.877D-04
46	2.300E 01	1.620D-04
47	2.350E 01	0.0
48	2.400E 01	-1.984D-04
49	2.450E 01	-4.314D-04
50	2.500E 01	-6.979D-04
51	2.550E 01	-9.969D-04
52	2.600E 01	-1.327D-03
53	2.650E 01	-1.688D-03
54	2.700E 01	-2.079D-03
55	2.750E 01	-2.497D-03
56	2.800E 01	-2.944D-03
57	2.850E 01	-3.416D-03
58	2.900E 01	-3.914D-03
59	2.950E 01	-4.436D-03
60	3.000E 01	-4.981D-03
61	3.050E 01	-5.548D-03
62	3.100E 01	-6.137D-03
63	3.150E 01	-6.746D-03
64	3.200E 01	-7.373D-03
65	3.250E 01	-8.019D-03
66	3.300E 01	-8.681D-03
67	3.350E 01	-9.360D-03
68	3.400E 01	-1.005D-02
69	3.450E 01	-1.076D-02
70	3.500E 01	-1.148D-02
71	3.550E 01	-1.221D-02
72	3.600E 01	-1.295D-02
73	3.650E 01	-1.370D-02
74	3.700E 01	-1.446D-02
75	3.750E 01	-1.522D-02
76	3.800E 01	-1.599D-02
77	3.850E 01	-1.677D-02
78	3.900E 01	-1.754D-02
79	3.950E 01	-1.832D-02
80	4.000E 01	-1.910D-02
81	4.050E 01	0.0
82	4.100E 01	0.0
83	4.150E 01	0.0
84	4.200E 01	0.0
85	4.250E 01	0.0

PROB (CONTD)
40005 LKW EXAMPLE NO. 4 ONE COL. BENT BETWEEN SLAB SPANS JUNE 74
PART ONE (DESIGN LOAD CONDITIONS) KIP FT UNITS

TABLE 5 -- MULTI-LANE LOADING SUMMARY (*--CRITICAL NUMBER OF LANE LOADS)

MOMENT (FT-K)

AT STA	DEAD LD EFFECT	LANE ORDER	POSITIVE MAXIMUM	LOAD AT LANE	STA	LANE ORDER	NEGATIVE MAXIMUM	LOAD AT LANE	STA
30	-9.786E 02								
		0	0.0			0	-8.382E 02	1	8
		1	0.0			1	-8.382E 02	1	8
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		0*				0*			
37	-1.472E 03								
		0	0.0			0	-1.327E 03	1	8
		1	0.0			1	-1.327E 03	1	8
		2	0.0			2	-4.366E 01	2	32
		3	0.0			3	0.0		
		0*				2*			
47	-1.472E 03								
		0	0.0			0	-1.327E 03	3	56
		1	0.0			1	-1.327E 03	3	56
		2	0.0			2	-8.557E 01	2	34
		3	0.0			3	0.0		
		0*				2*			
54	-9.786E 02								
		0	0.0			0	-8.382E 02	3	56
		1	0.0			1	-8.382E 02	3	56
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		0*				0*			

SHEAR (K)

AT STA	DEAD LD EFFECT	LANE ORDER	POSITIVE MAXIMUM	LOAD AT LANE	STA	LANE ORDER	NEGATIVE MAXIMUM	LOAD AT LANE	STA
30	-1.272E 02								
		0	0.0			0	-1.397E 02	1	8
		1	0.0			1	-1.397E 02	1	8
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		0*				0*			
35	-1.471E 02								
		0	0.0			0	-1.397E 02	1	8
		1	0.0			1	-1.397E 02	1	8
		2	0.0			2	-2.096E 01	2	32
		3	0.0			3	0.0		
		0*				2*			
49	1.471E 02								
		0	1.397E 02	3	54	0	0.0		
		1	1.397E 02	3	54	1	0.0		
		2	3.493E 01	2	34	2	0.0		
		3	0.0			3	0.0		
		2*				0*			
54	1.272E 02								
		0	1.397E 02	3	56	0	0.0		
		1	1.397E 02	3	56	1	0.0		
		2	1.746E 00	2	34	2	0.0		
		3	0.0			3	0.0		
		2*				0*			

REACTION (K)

AT STA	DEAD LD EFFECT	LANE ORDER	POSITIVE MAXIMUM	LOAD AT LANE	STA	LANE ORDER	NEGATIVE MAXIMUM	LOAD AT LANE	STA
37	1.751E 02								
		0	4.051E 02	1	8	0	-2.654E 02	3	56
		1	4.051E 02	1	8	1	-2.654E 02	3	56
		2	6.985E 01	2	32	2	0.0		
		3	0.0			3	0.0		
		2*				0*			
47	1.751E 02								
		0	4.051E 02	3	56	0	-2.654E 02	1	8
		1	4.051E 02	3	56	1	-2.654E 02	1	8
		2	9.779E 01	2	34	2	0.0		
		3	0.0			3	0.0		
		2*				0*			

TABLE 6 -- ENVELOPES OF MAXIMUM VALUES

STA	DIST X (FT)	MAX + MOM (FT-K)	MAX - MOM (FT-K)	MAX + SHEAR (K)	MAX - SHEAR (K)
-1	-5.000E-01	0.0	0.0	0.0	0.0
0	0.0	0.0	0.0	0.0	0.0
1	5.000E-01	0.0	0.0	0.0	0.0
2	1.000E 00	0.0	0.0	0.0	0.0
3	1.500E 00	0.0	0.0	0.0	0.0
4	2.000E 00	0.0	0.0	6.323E-11	-4.215E-12
5	2.500E 00	6.323E-11	-4.215E-12	0.0	-1.595E 01
6	3.000E 00	0.0	-1.595E 01	0.0	-3.382E 01
7	3.500E 00	0.0	-3.382E 01	0.0	-3.764E 01
8	4.000E 00	0.0	-5.359E 01	0.0	-4.321E 01
9	4.500E 00	0.0	-7.703E 01	0.0	-5.228E 01
10	5.000E 00	0.0	-1.059E 02	0.0	-6.311E 01
11	5.500E 00	0.0	-1.401E 02	0.0	-7.394E 01
12	6.000E 00	0.0	-1.798E 02	0.0	-8.478E 01
13	6.500E 00	0.0	-2.249E 02	0.0	-9.562E 01
14	7.000E 00	0.0	-2.754E 02	0.0	-1.065E 02
15	7.500E 00	0.0	-3.314E 02	0.0	-1.173E 02
16	8.000E 00	0.0	-3.928E 02	0.0	-1.282E 02
17	8.500E 00	0.0	-4.596E 02	0.0	-1.391E 02
18	9.000E 00	0.0	-5.318E 02	0.0	-1.499E 02
19	9.500E 00	0.0	-6.095E 02	0.0	-1.608E 02
20	1.000E 01	0.0	-6.926E 02	0.0	-1.717E 02
21	1.050E 01	0.0	-7.812E 02	0.0	-1.826E 02
22	1.100E 01	0.0	-8.752E 02	0.0	-1.935E 02
23	1.150E 01	0.0	-9.746E 02	0.0	-2.044E 02
24	1.200E 01	0.0	-1.080E 03	0.0	-2.153E 02
25	1.250E 01	0.0	-1.190E 03	0.0	-2.262E 02
26	1.300E 01	0.0	-1.306E 03	0.0	-2.371E 02
27	1.350E 01	0.0	-1.427E 03	0.0	-2.481E 02
28	1.400E 01	0.0	-1.554E 03	0.0	-2.572E 02
29	1.450E 01	0.0	-1.684E 03	0.0	-2.629E 02
30	1.500E 01	0.0	-1.817E 03	0.0	-2.669E 02
31	1.550E 01	0.0	-1.951E 03	0.0	-2.709E 02
32	1.600E 01	0.0	-2.088E 03	0.0	-2.766E 02
33	1.650E 01	0.0	-2.228E 03	0.0	-2.858E 02
34	1.700E 01	0.0	-2.373E 03	0.0	-2.968E 02
35	1.750E 01	0.0	-2.525E 03	0.0	-3.078E 02
36	1.800E 01	0.0	-2.681E 03	0.0	-3.187E 02
37	1.850E 01	0.0	-2.843E 03	0.0	-2.003E 02
38	1.900E 01	0.0	-2.686E 03	3.094E 02	-2.494E 02
39	1.950E 01	0.0	-2.534E 03	2.984E 02	-2.534E 02
40	2.000E 01	0.0	-2.387E 03	2.874E 02	-2.574E 02
41	2.050E 01	0.0	-2.247E 03	2.764E 02	-2.684E 02
42	2.100E 01	0.0	-2.118E 03	2.654E 02	-2.794E 02
43	2.150E 01	0.0	-2.261E 03	2.614E 02	-2.904E 02
44	2.200E 01	0.0	-2.408E 03	2.574E 02	-3.014E 02
45	2.250E 01	0.0	-2.562E 03	2.534E 02	-3.124E 02
46	2.300E 01	0.0	-2.721E 03	2.494E 02	-3.233E 02
47	2.350E 01	0.0	-2.885E 03	2.003E 02	0.0
48	2.400E 01	0.0	-2.716E 03	3.327E 02	0.0
49	2.450E 01	0.0	-2.553E 03	3.217E 02	0.0
50	2.500E 01	0.0	-2.394E 03	3.107E 02	0.0
51	2.550E 01	0.0	-2.242E 03	2.998E 02	0.0
52	2.600E 01	0.0	-2.095E 03	2.888E 02	0.0
53	2.650E 01	0.0	-1.953E 03	2.779E 02	0.0
54	2.700E 01	0.0	-1.817E 03	2.686E 02	0.0
55	2.750E 01	0.0	-1.684E 03	2.629E 02	0.0
56	2.800E 01	0.0	-1.554E 03	2.572E 02	0.0
57	2.850E 01	0.0	-1.427E 03	2.481E 02	0.0
58	2.900E 01	0.0	-1.306E 03	2.371E 02	0.0
59	2.950E 01	0.0	-1.190E 03	2.262E 02	0.0
60	3.000E 01	0.0	-1.080E 03	2.153E 02	0.0
61	3.050E 01	0.0	-9.746E 02	2.044E 02	0.0
62	3.100E 01	0.0	-8.752E 02	1.935E 02	0.0
63	3.150E 01	0.0	-7.812E 02	1.826E 02	0.0
64	3.200E 01	0.0	-6.926E 02	1.717E 02	0.0
65	3.250E 01	0.0	-6.095E 02	1.608E 02	0.0
66	3.300E 01	0.0	-5.318E 02	1.499E 02	0.0
67	3.350E 01	0.0	-4.596E 02	1.391E 02	0.0
68	3.400E 01	0.0	-3.928E 02	1.282E 02	0.0
69	3.450E 01	0.0	-3.314E 02	1.173E 02	0.0
70	3.500E 01	0.0	-2.754E 02	1.065E 02	0.0
71	3.550E 01	0.0	-2.249E 02	9.562E 01	0.0
72	3.600E 01	0.0	-1.798E 02	8.478E 01	0.0
73	3.650E 01	0.0	-1.401E 02	7.394E 01	0.0
74	3.700E 01	0.0	-1.059E 02	6.311E 01	0.0
75	3.750E 01	0.0	-7.703E 01	5.228E 01	0.0
76	3.800E 01	0.0	-5.359E 01	4.321E 01	0.0
77	3.850E 01	0.0	-3.382E 01	3.764E 01	0.0
78	3.900E 01	0.0	-1.595E 01	3.382E 01	0.0
79	3.950E 01	8.431E-12	-1.686E-11	1.595E 01	0.0
80	4.000E 01	0.0	0.0	1.686E-11	-8.431
81	4.050E 01	0.0	0.0	0.0	0.0
82	4.100E 01	0.0	0.0	0.0	0.0
83	4.150E 01	0.0	0.0	0.0	0.0
84	4.200E 01	0.0	0.0	0.0	0.0
85	4.250E 01	0.0	0.0	0.0	0.0

TABLE 7 -- MAXIMUM SUPPORT REACTIONS

STA	DIST X FT	MAX + REACT K	MAX - REACT K
37	1.850E 01	6.501E 02	-9.034E 01
47	2.350E 01	6.780E 02	-9.034E 01

TABLE 8 -- SCALES FOR PLOT OUTPUT

NO PLOTS SPECIFIED FOR PROBLEM, 40085

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

BENT CAP PROGRAM

SHEET 2 OF 2 BY LKW
DATE _____ CONTROL _____
DISTRICT _____ IPE _____
COUNTY _____ PROB. NO. 40006

IDENTIFICATION OF PROBLEM (2 CARDS EACH PROB.)

PROB. NO. 40006 01 | DISTRICT INITIALS LKW | DESCRIPTION OF PROBLEM (LETTERS AND/OR NUMBERS & ALLOWABLE SYMBOLS) EXAMPLE NO. 4 PART TWO JUNE 7K

02 | IPE | NOTE: USE ONLY THESE SYMBOLS + - . ( ) / # $ = (APPLICATION OF SIDEWALK OVERLOAD) KIP FT UNITS

TABLE 1. PROGRAM-CONTROL DATA (1 CARD EACH PROBLEM)

03 | ENTER "1" TO HOLD FROM PRECEDING PROBLEM: ENVELOPES 1 | NO. OF CARDS IN THIS PROBLEM: TABLE 2: 1 | TABLE 3: 1 | TABLE 4: 1 | TABLE 2: 0 | TABLE 3: 0 | TABLE 4: 5 | ENTER "1" TO CLEAR ENVELOPES OF MAXIMUM VALUES PRIOR TO MULTI-LANE LOADING | ENTER "1" TO PLOT ENVELOPES | SKEW ANGLE | ENTER (-1) TO ELIMINATE TABLE 5 ON OUTPUT LISTING

TABLE 2. CONSTANTS (2 CARDS UNLESS DATA HELD FROM PRECEDING PROBLEM)

04 | NUMBER OF INCREMENTS | INCREMENT LENGTH | MOVABLE-LOAD DATA: NUMBER OF INCREMENTS | START STATION | STOP STATION | MOVABLE LOAD INCREMENT

No Cards

05 | MAX. NUMBER LANE LOADS | LOAD REDUCTION FACTORS ACCORDING TO NUMBER OF LANES LOADED: 1 | 2 | 3 | 4 | 5

TABLE 3. LISTS OF STATIONS (NUMBER OF CARDS AS GIVEN IN TABLE 1. — NONE OR 14)

06 | LANES | STRS | SUPS | NUMBER OF MOMENT CONTROL POINTS | NUMBER OF SHEAR CONTROL POINTS

07 | STATION AT LEFT OF LANE

08 | STATION AT RIGHT OF LANE

09, 10, 11 | STATION AT STRINGERS (FRACTIONAL TENTHS OF INCREMENTS PERMITTED, F-FORMAT)

No Cards

12, 13 | STATION AT SUPPORTS

14, 15, 16 | STATION AT DESIGN CONTROL POINTS FOR MOMENT

17, 18, 19 | STATION AT DESIGN CONTROL POINTS FOR SHEAR

File 5.29-1

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

BENT CAP PROGRAM (CONT'D)

TABLE 4 — STIFFNESS AND LOAD DATA (NUMBER OF CARDS AS GIVEN IN TABLE I. ALL DATA ADDED TO STORAGE)

PROBLEM NUMBER		FIXED CAP STATION FROM	FIXED CAP STATION TO	MOVABLE CONTINUED IF=1	FIXED-POSITION DATA: BENDING-STIFFNESS OF CAP	FIXED-POSITION DATA: SIDEWALK & SLAB LOADS	FIXED-POSITION DATA: STRINGER & CAP LOADS	MOVABLE POSITION SLAB LOADS	REMARKS
40006	20	0	20					+6.985E+00	Cancel LL+I
	21	5	5				-3.580E+00		Ult. Truck on Sidewalk
	22	14	14				-3.580E+00		
	23	5	5				+1.842E+01		Cancel Side-walk LL.
	24	79	79				+1.842E+01		
	25								
	26								
	27								
	28								
	29								
	30								
	31								
	32								
	33								
	34								
	35								
	36								
	37								
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	41								
	42								
	43								
	44								
	45								
	46								
	47								
	48								
	49								
	50								
	51								
	52								
	53								
	54								
	55								
	56								
	57								

5 9 | 10 11 | 16 20 | 25 30 | 40 | 50 | 60 | 70

File 5.29-2

PROGRAM CAP 17 - DECK THD - MATLOCK,WBI,FE,JJP REVISION DATE # 12 JUN 68

PROB
40006 LKW EXAMPLE NO. 4 PART TWO JUNE 74
(APPLICATION OF SIDEWALK OVERLOAD) KIP FT UNITS

TABLE 1 -- PROGRAM-CONTROL DATA

	ENVELOPES OF MAXIMUMS	TABLE NUMBER 2	3	4
OPTIONS TO HOLD (IF=1) FROM PRECEDING PROB	1	1	1	1
NUMBER OF ADDITIONAL CARDS FOR CURRENT PROB		0	0	5
OPTION (IF=1) TO CLEAR ENVELOPES BEFORE LANE LOADINGS				0
OPTION (IF=1) TO PLOT DESIGN VARIABLE ENVELOPES				1
OPTION (IF=-1)TO OMIT OUTPUT TABLE 5				0
ANGLE OF SKEW, DEGREES		0.0		

TABLE 2 -- CONSTANTS

USING DATA FROM THE PREVIOUS PROBLEM

TABLE 3 -- LISTS OF STATIONS

USING DATA FROM THE PREVIOUS PROBLEM

TABLE 4 -- CAP STIFFNESS, AND.DATA FOR BOTH FIXED AND MOVABLE LOADS

USING DATA FROM THE PREVIOUS PROBLEM PLUS

FIXED-OR-MOVABLE STA FROM	STA TO	CONTD IF=1	FIXED-POSITION DATA - CAP BENDING STIFFNESS (K-FT*FT)	SIDEWALK, SLAB LOADS (K)	STRINGER, CAP LOADS (K)	MOVABLE-POSITION SLAB LOADS (K)
0	20	0	0.0	0.0	0.0	6.985E 00
5	5	0	0.0	0.0	-3.580E 00	0.0
14	14	0	0.0	0.0	-3.580E 00	0.0
5	5	0	0.0	0.0	1.842E 01	0.0
79	79	0	0.0	0.0	1.842E 01	0.0

TABLE 4A -- DEAD LOAD DEFLECTIONS

STA	DIST X (FT)	DEFLECTION (FT)
-1	-5.000E-01	0.0
0	0.0	0.0
1	5.000E-01	0.0
2	1.000E 00	0.0
3	1.500E 00	0.0
4	2.000E 00	-1.585D-02
5	2.500E 00	-1.522D-02
6	3.000E 00	-1.459D-02
7	3.500E 00	-1.396D-02
8	4.000E 00	-1.333D-02
9	4.500E 00	-1.270D-02
10	5.000E 00	-1.208D-02
11	5.500E 00	-1.146D-02
12	6.000E 00	-1.085D-02
13	6.500E 00	-1.024D-02
14	7.000E 00	-9.637D-03
15	7.500E 00	-9.043D-03
16	8.000E 00	-8.459D-03
17	8.500E 00	-7.884D-03
18	9.000E 00	-7.320D-03
19	9.500E 00	-6.768D-03
20	1.000E 01	-6.229D-03
21	1.050E 01	-5.704D-03
22	1.100E 01	-5.194D-03
23	1.150E 01	-4.699D-03
24	1.200E 01	-4.221D-03
25	1.250E 01	-3.762D-03
26	1.300E 01	-3.321D-03
27	1.350E 01	-2.900D-03
28	1.400E 01	-2.499D-03
29	1.450E 01	-2.121D-03
30	1.500E 01	-1.765D-03
31	1.550E 01	-1.434D-03
32	1.600E 01	-1.127D-03
33	1.650E 01	-8.457D-04
34	1.700E 01	-5.915D-04
35	1.750E 01	-3.652D-04
36	1.800E 01	-1.677D-04
37	1.850E 01	0.0
38	1.900E 01	1.361D-04
39	1.950E 01	2.411D-04
40	2.000E 01	3.153D-04
41	2.050E 01	3.592D-04
42	2.100E 01	3.731D-04
43	2.150E 01	3.573D-04
44	2.200E 01	3.119D-04
45	2.250E 01	2.372D-04
46	2.300E 01	1.332D-04
47	2.350E 01	0.0
48	2.400E 01	-1.623D-04
49	2.450E 01	-3.521D-04
50	2.500E 01	-5.685D-04
51	2.550E 01	-8.103D-04
52	2.600E 01	-1.077D-03
53	2.650E 01	-1.367D-03
54	2.700E 01	-1.680D-03
55	2.750E 01	-2.014D-03

Since all dead load deflections for part two are less than those for part 1, no larger maximums will be created for the envelopes.

56	2.800E 01	-2.369D-03
57	2.850E 01	-2.744D-03
58	2.900E 01	-3.138D-03
59	2.950E 01	-3.550D-03
60	3.000E 01	-3.979D-03
61	3.050E 01	-4.424D-03
62	3.100E 01	-4.884D-03
63	3.150E 01	-5.358D-03
64	3.200E 01	-5.845D-03
65	3.250E 01	-6.345D-03
66	3.300E 01	-6.856D-03
67	3.350E 01	-7.378D-03
68	3.400E 01	-7.909D-03
69	3.450E 01	-8.449D-03
70	3.500E 01	-8.997D-03
71	3.550E 01	-9.552D-03
72	3.600E 01	-1.011D-02
73	3.650E 01	-1.068D-02
74	3.700E 01	-1.125D-02
75	3.750E 01	-1.182D-02
76	3.800E 01	-1.240D-02
77	3.850E 01	-1.298D-02
78	3.900E 01	-1.356D-02
79	3.950E 01	-1.414D-02
80	4.000E 01	-1.472D-02
81	4.050E 01	0.0
82	4.100E 01	0.0
83	4.150E 01	0.0
84	4.200E 01	0.0
85	4.250E 01	0.0

Since the movable load magnitude has been set to zero, algebraically the results for the random and multilane loading summary are also zero. This means the envelopes will contain only fixed load results.

TABLE 5 -- MULTI-LANE LOADING SUMMARY (*--CRITICAL NUMBER OF LANE LOADS)

MOMENT (FT-K)

AT STA	DEAD LD EFFECT	LANE ORDER	POSITIVE MAXIMUM	LOAD AT LANE STA	LANE ORDER	NEGATIVE MAXIMUM	LOAD AT LANE STA
30	-8.217E 02						
		0	0.0		0	0.0	
		1	0.0		1	0.0	
		2	0.0		2	0.0	
		3	0.0		3	0.0	
		0*			0*		
37	-1.276E 03						
		0	0.0		0	0.0	
		1	0.0		1	0.0	
		2	0.0		2	0.0	
		3	0.0		3	0.0	
		0*			0*		
47	-1.178E 03						
		0	0.0		0	0.0	
		1	0.0		1	0.0	
		2	0.0		2	0.0	
		3	0.0		3	0.0	
		0*			0*		
54	-7.483E 02						
		0	0.0		0	0.0	
		1	0.0		1	0.0	
		2	0.0		2	0.0	
		3	0.0		3	0.0	
		0*			0*		

SHEAR (K)

AT STA	DEAD LD EFFECT	LANE ORDER	POSITIVE MAXIMUM	LOAD AT LANE STA	LANE ORDER	NEGATIVE MAXIMUM	LOAD AT LANE STA
30	-1.159E 02						
		0	0.0		0	0.0	
		1	0.0		1	0.0	
		2	0.0		2	0.0	
		3	0.0		3	0.0	
		0*			0*		
35	-1.358E 02						
		0	0.0		0	0.0	
		1	0.0		1	0.0	
		2	0.0		2	0.0	
		3	0.0		3	0.0	
		0*			0*		
49	1.287E 02						
		0	0.0		0	0.0	

		1	0.0		1	0.0	
		2	0.0		2	0.0	
		3	0.0		3	0.0	
		0*			0*		
54	1.088E 02						
		0	0.0		0	0.0	
		1	0.0		1	0.0	
		2	0.0		2	0.0	
		3	0.0		3	0.0	
		0*			0*		

REACTION (K)

AT STA	DEAD LD EFFECT	LANE ORDER	POSITIVE MAXIMUM	LOAD AT LANE STA	LANE ORDER	NEGATIVE MAXIMUM	LOAD AT LANE STA
37	1.835E 02						
		0	0.0		0	0.0	
		1	0.0		1	0.0	
		2	0.0		2	0.0	
		3	0.0		3	0.0	
		0*			0*		
47	1.370E 02						
		0	0.0		0	0.0	
		1	0.0		1	0.0	
		2	0.0		2	0.0	
		3	0.0		3	0.0	
		0*			0*		

None of the above maximums exceed those for Part 1; thus the sidewalk vehicle loadings do not control for this cap.

TABLE 6 -- ENVELOPES OF MAXIMUM VALUES

STA	DIST X (FT)	MAX + MOM (FT-K)	MAX - MOM (FT-K)	MAX + SHEAR (K)	MAX - SHEAR (K)
-1	-5.000E-01	0.0	0.0	0.0	0.0
0	0.0	0.0	0.0	0.0	0.0
1	5.000E-01	0.0	0.0	0.0	0.0
2	1.000E 00	0.0	0.0	0.0	0.0
3	1.500E 00	0.0	0.0	0.0	0.0
4	2.000E 00	0.0	0.0	6.323E-11	-4.215E-12
5	2.500E 00	6.323E-11	-4.215E-12	0.0	-1.595E 01
6	3.000E 00	0.0	-1.595E 01	0.0	-3.382E 01
7	3.500E 00	0.0	-3.382E 01	0.0	-3.764E 01
8	4.000E 00	0.0	-5.359E 01	0.0	-4.321E 01
9	4.500E 00	0.0	-7.703E 01	0.0	-5.228E 01
10	5.000E 00	0.0	-1.059E 02	0.0	-6.311E 01
11	5.500E 00	0.0	-1.401E 02	0.0	-7.394E 01
12	6.000E 00	0.0	-1.798E 02	0.0	-8.478E 01
13	6.500E 00	0.0	-2.249E 02	0.0	-9.562E 01
14	7.000E 00	0.0	-2.754E 02	0.0	-1.065E 02
15	7.500E 00	0.0	-3.314E 02	0.0	-1.173E 02
16	8.000E 00	0.0	-3.928E 02	0.0	-1.282E 02
17	8.500E 00	0.0	-4.596E 02	0.0	-1.391E 02
18	9.000E 00	0.0	-5.318E 02	0.0	-1.499E 02
19	9.500E 00	0.0	-6.095E 02	0.0	-1.608E 02
20	1.000E 01	0.0	-6.926E 02	0.0	-1.717E 02
21	1.050E 01	0.0	-7.812E 02	0.0	-1.826E 02
22	1.100E 01	0.0	-8.752E 02	0.0	-1.935E 02
23	1.150E 01	0.0	-9.746E 02	0.0	-2.044E 02
24	1.200E 01	0.0	-1.080E 03	0.0	-2.153E 02
25	1.250E 01	0.0	-1.190E 03	0.0	-2.262E 02
26	1.300E 01	0.0	-1.306E 03	0.0	-2.371E 02
27	1.350E 01	0.0	-1.427E 03	0.0	-2.481E 02
28	1.400E 01	0.0	-1.554E 03	0.0	-2.572E 02
29	1.450E 01	0.0	-1.684E 03	0.0	-2.629E 02
30	1.500E 01	0.0	-1.817E 03	0.0	-2.669E 02
31	1.550E 01	0.0	-1.951E 03	0.0	-2.709E 02
32	1.600E 01	0.0	-2.088E 03	0.0	-2.766E 02
33	1.650E 01	0.0	-2.228E 03	0.0	-2.858E 02
34	1.700E 01	0.0	-2.373E 03	0.0	-2.968E 02
35	1.750E 01	0.0	-2.525E 03	0.0	-3.078E 02
36	1.800E 01	0.0	-2.681E 03	0.0	-3.187E 02
37	1.850E 01	0.0	-2.843E 03	0.0	-2.003E 02
38	1.900E 01	0.0	-2.686E 03	3.094E 02	-2.494E 02
39	1.950E 01	0.0	-2.534E 03	2.984E 02	-2.534E 02
40	2.000E 01	0.0	-2.387E 03	2.874E 02	-2.574E 02
41	2.050E 01	0.0	-2.247E 03	2.764E 02	-2.684E 02
42	2.100E 01	0.0	-2.118E 03	2.654E 02	-2.794E 02
43	2.150E 01	0.0	-2.261E 03	2.614E 02	-2.904E 02
44	2.200E 01	0.0	-2.408E 03	2.574E 02	-3.014E 02
45	2.250E 01	0.0	-2.562E 03	2.534E 02	-3.124E 02
46	2.300E 01	0.0	-2.721E 03	2.494E 02	-3.233E 02
47	2.350E 01	0.0	-2.885E 03	2.003E 02	0.0
48	2.400E 01	0.0	-2.716E 03	3.327E 02	0.0
49	2.450E 01	0.0	-2.553E 03	3.217E 02	0.0
50	2.500E 01	0.0	-2.394E 03	3.107E 02	0.0
51	2.550E 01	0.0	-2.242E 03	2.998E 02	0.0
52	2.600E 01	0.0	-2.095E 03	2.888E 02	0.0
53	2.650E 01	0.0	-1.953E 03	2.779E 02	0.0
54	2.700E 01	0.0	-1.817E 03	2.686E 02	0.0
55	2.750E 01	0.0	-1.684E 03	2.629E 02	0.0

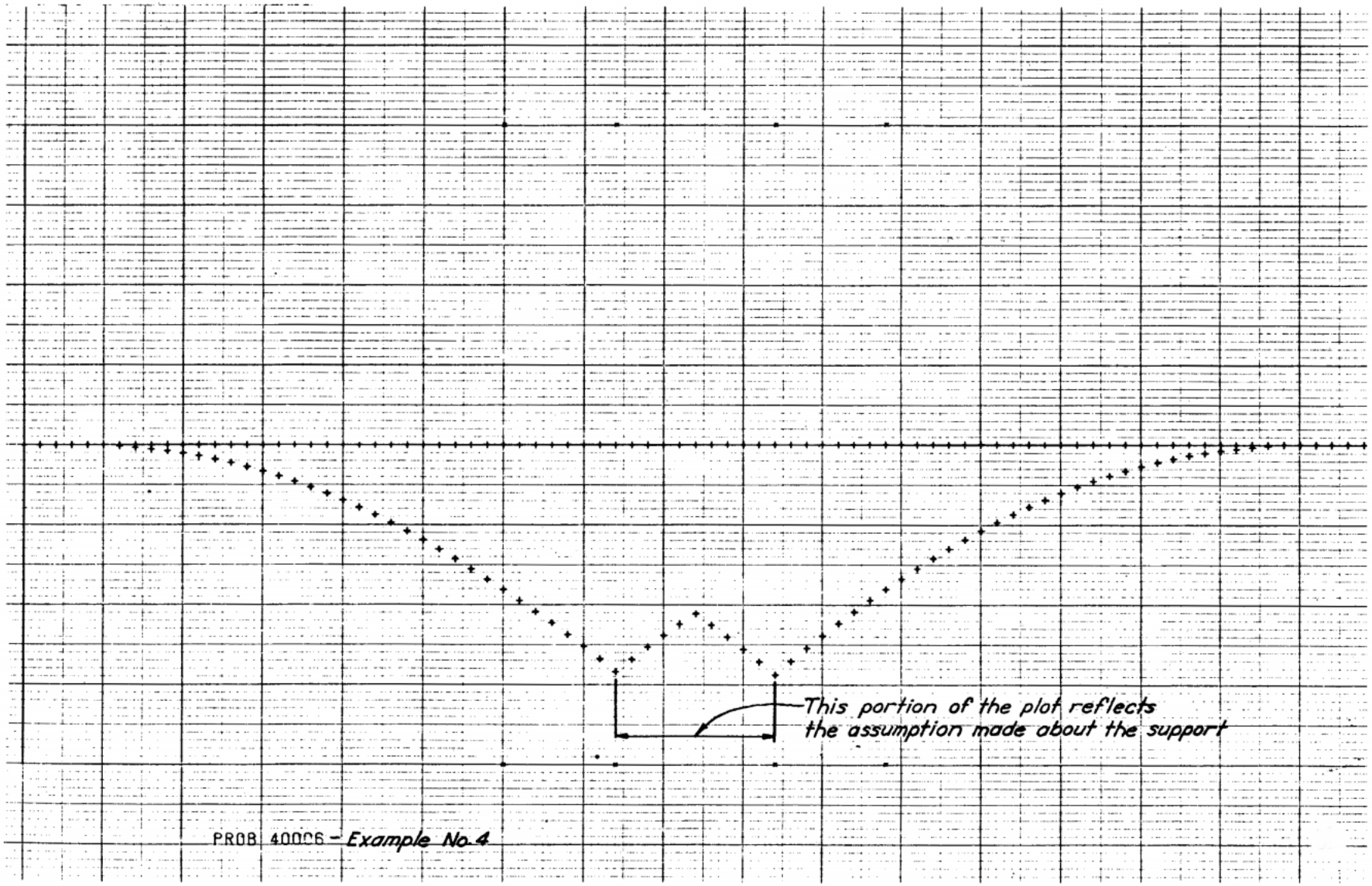
56	2.800E 01	0.0	-1.554E 03	2.572E 02	0.0
57	2.850E 01	0.0	-1.427E 03	2.481E 02	0.0
58	2.900E 01	0.0	-1.306E 03	2.371E 02	0.0
59	2.950E 01	0.0	-1.190E 03	2.262E 02	0.0
60	3.000E 01	0.0	-1.080E 03	2.153E 02	0.0
61	3.050E 01	0.0	-9.746E 02	2.044E 02	0.0
62	3.100E 01	0.0	-8.752E 02	1.935E 02	0.0
63	3.150E 01	0.0	-7.812E 02	1.826E 02	0.0
64	3.200E 01	0.0	-6.926E 02	1.717E 02	0.0
65	3.250E 01	0.0	-6.095E 02	1.608E 02	0.0
66	3.300E 01	0.0	-5.318E 02	1.499E 02	0.0
67	3.350E 01	0.0	-4.596E 02	1.391E 02	0.0
68	3.400E 01	0.0	-3.928E 02	1.282E 02	0.0
69	3.450E 01	0.0	-3.314E 02	1.173E 02	0.0
70	3.500E 01	0.0	-2.754E 02	1.065E 02	0.0
71	3.550E 01	0.0	-2.249E 02	9.562E 01	0.0
72	3.600E 01	0.0	-1.798E 02	8.478E 01	0.0
73	3.650E 01	0.0	-1.401E 02	7.394E 01	0.0
74	3.700E 01	0.0	-1.059E 02	6.311E 01	0.0
75	3.750E 01	0.0	-7.703E 01	5.228E 01	0.0
76	3.800E 01	0.0	-5.359E 01	4.321E 01	0.0
77	3.850E 01	0.0	-3.382E 01	3.764E 01	0.0
78	3.900E 01	0.0	-1.595E 01	3.382E 01	0.0
79	3.950E 01	8.431E-12	-1.686E-11	1.595E 01	0.0
80	4.000E 01	0.0	0.0	1.686E-11	-8.431E-12
81	4.050E 01	0.0	0.0	0.0	0.0
82	4.100E 01	0.0	0.0	0.0	0.0
83	4.150E 01	0.0	0.0	0.0	0.0
84	4.200E 01	0.0	0.0	0.0	0.0
85	4.250E 01	0.0	0.0	0.0	0.0

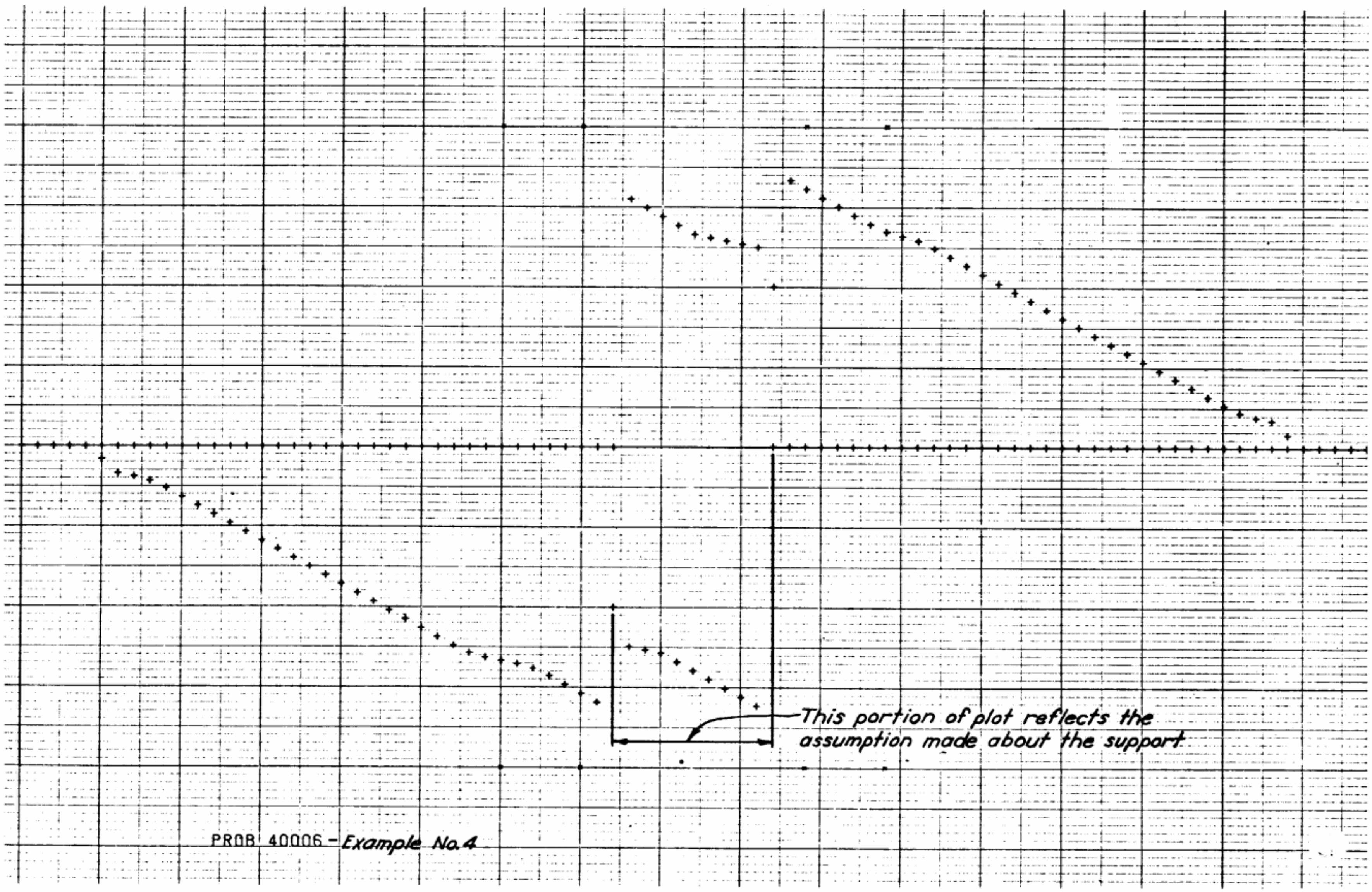
TABLE 7 -- MAXIMUM SUPPORT REACTIONS

STA	DIST X FT	MAX + REACT K	MAX - REACT K
37	1.850E 01	6.501E 02	-9.034E 01
47	2.350E 01	6.780E 02	-9.034E 01

TABLE 8 -- SCALES FOR PLOT OUTPUT

DISTANCE	20. INCHES =	50.	FT
MOMENT	4. INCHES =	4000.	FT-K
SHEAR	4. INCHES =	400.	K


This portion of the plot reflects
the assumption made about the support
PROB 40006 – Example No. 4


This portion of plot reflects the assumption made about the support.
PROB 40006 - Example No. 4

EXAMPLE NO. 5 - SPECIAL CONDITIONS (PROBS 40007 AND 40008)

The structural detail arrangements in this Example have been arbitrarily arranged as shown on the sketch to demonstrate several special conditions. Rarely will all of these occur in a single bent. Dimensions shown should be considered as academic; no effort has been made to conform to current design or detail standards.

The first of these special conditions occurs at station 50 and consists of a hinge (pinned connection). The next occurs between station 108 where the cap ends, and station 116 where it begins again, while the superstructure continues across the gap. Then, at station 127 there is an open joint in the deck slab but the cap continues on under the rest of the superstructure.

The most troublesome of these conditions is the one inch open joint at station 127. Since the bent cap program is not designed to analyze a roadway slab with such a discontinuity, it is again necessary to use two problems to detour around the open joint. Part one, Problem 40007, is used to calculate the effects of most dead and fixed position loads and the effects of the live load placed on the deck slab between the left face-of-rail (station 9) and the open joint which must also be used as a lane boundary. The envelopes of maximums are retained for use in part two, Problem 40008, and the effects of the remaining dead and

fixed position loads and of the live load between the open joint and the right face-of-rail (station 201) are used to expand the beld-over envelopes from part one to develop the final envelopes.

Hinges or pins may be used at any location provided that the resulting structure is stable and that no loads are placed directly on the hinge. For a typical slab and girder bridge this means that cap hinges should not be specified at either stringer locations or support (column) locations. Also the cap weight should be zero at the hinge. Gaps may be located anywhere provided no loads are placed directly in them and the structure is stable.

For bents supporting slab type superstructures the program applies the live load station by station directly to the cap; consequently direct use of hinges or gaps is precluded. They may be used however by detouring around them with one or more extra problems as is done here to detour around the open joint.

Referring now to the input for part one, Problem 40007, Table 1 is input in the usual manner. Table 2, Card 04, shows the range for the movable load to be from station 9 to station 107, i.e., from the face of the left rail to the open joint including the median area. The median could have been excluded if desired except that the roadway width between the open joint and the median would be smaller than the width of the movable load. By ignoring

the presence of the median, the cap design will accommodate any future removal of the median for widening, etc. The corresponding card of part two is then used for the balance of the roadway.

In Table 3 the location of the outside stringer on each bent has been specified to the nearest tenth of a station as a demonstration of this procedure although it will seldom be necessary to use it. For the usual range of bent dimensions, whole stations will be sufficiently precise for design work.

Table 4 for Problem 40007 is quite full and appears complicated because all loads have been separated for entry. Cards 20 thru 25 define the stiffness and weight of both caps including the hinge and the gap between the caps. The cap weight goes to zero at the hinge to avoid placing any load there. The definition continues thru the hinge because to specify a complete increment of zero stiffness would define a gap and result in instability. Cards 26 and 27, 33 and 34, 35 and 36, and 40 and 41 show the proportioning of stringer loads required by use of fractional stationing.

Stringer loads have been entered in the usual manner except that they are stringer weight only. Cards 43 thru 46 show fixed loads applied to the deck slab including the weight of the deck slabs. These loads are distributed to the stringers and applied thru them to the cap. Distributed loads entered in this data block are not adjusted for skew.

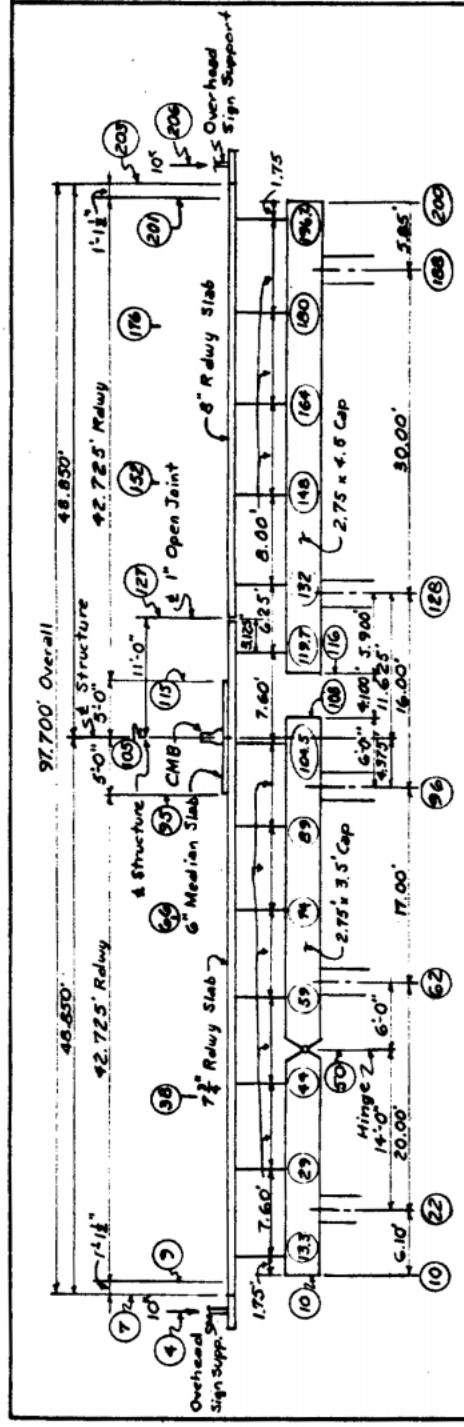
Table 4 for Problem 40008 shows only the changes from the conditions in part 1, since Table 4 from part one has been held. The first four cards cancel loads on the left roadway and the last two cards add loads on the right roadway.

File 1284

DESIGN LKW DATE 6-74
CK. DSN. DATE
DESIGN FOR Example No. 5 Unusual Conditions

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

COUNTY
CONTROL
I.P.E.
HIGHWAY
SHEET OF



Input Data Calculations:
Use 6" Increment
Total No. of Increments = 207
Span lengths: 70' Each
Skew Angle = 36°52' = 3.687 E+01°

Dead Loads:
C.Sm = 1.5 x 0.515 x 70.0 = 46.9^K (Unit)

7½" Slab = 0.6458 x 1.0 x 0.150 x 70.0 x 1.30 x 6.783 x ½ = 4.409^K/Sta. (Unit)

8" Slab = 0.6667 / 0.6458 x 4.409 = 4.552^K/Sta (Unit)

6" Median Slab = 0.5000 / 0.6458 x 4.409 = 3.414^K/Sta. (Unit)

C.M.B. = 0.485 x 70 x 1.30 = 44.1^K (Unit)

Sign Supports:
Assume 10^K Each (Unit) including mounting brackets

Live Load + Impact
I = 50 / (70+125) = 25.6 %
LLR = 0.640 x 70.0 + 18 = 62.8^K/Lane
Unit LL+I/R = 1.30 x 1.256 x 62.8 = 177.5 ^K/Ln
= 177.5 ÷ 20 = 8.874 ^K/Sta.

Cap Data:
Stiffnesses:
Left = 2.75 x 3.5³ / 12 x 3000 x 144 = 4.245 E+06
Right = 2.75 x 4.5³ / 12 x 3000 x 144 = 9.021 E+06

Weights:
Left = 1.30 x 2.75 x 3.5 x 0.150 x ½ = 0.9987 ^K/Sta.
Right = 1.30 x 2.75 x 4.5 x 0.150 x ½ = 1.207 ^K/Sta.

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

BENT CAP PROGRAM

SHEET 1 OF 2 BY LKW
DATE _____ CONTROL _____
DISTRICT _____ IPE _____
COUNTY _____ PROB. NO. 40007

IDENTIFICATION OF PROBLEM (2 CARDS EACH PROB.)

PROB. NO.	DISTRICT	INITIALS	DESCRIPTION OF PROBLEM (LETTERS AND/OR NUMBERS & ALLOWABLE SYMBOLS)
40007 01		LKW	EXAMPLE 5 SPECIAL CONDITIONS DEMONSTRATION JUNE 74
02	IPE		NOTE: USE ONLY THESE SYMBOLS + - . , ( ) / # $ = PART 1 - PART TO LEFT OF OPEN SLAB JOINT KIP FT UNITS

TABLE 1. PROGRAM-CONTROL DATA (1 CARD EACH PROBLEM)

	ENTER "1" TO HOLD FROM PRECEDING PROBLEM	ENVELOPES	NO. OF CARDS IN THIS PROBLEM TABLE 2	TABLE 3	TABLE 4	2	3	4	ENTER "1" TO CLEAR ENVELOPES OF MAXIMUM VALUES PRIOR TO MULTI-LANE LOADING	ENTER "1" TO PLOT ENVELOPES	SKEW ANGLE
03						2	14	28			3.687E+01

ENTER (-1) TO ELIMINATE TABLE 5 ON OUTPUT LISTING

TABLE 2. CONSTANTS (2 CARDS UNLESS DATA HELD FROM PRECEDING PROBLEM)

	NUMBER OF INCREMENTS	INCREMENT LENGTH	MOVABLE-LOAD DATA: NUMBER OF INCREMENTS	START STATION	STOP STATION	MOVABLE LOAD INCREMENT
04	207	5.000E-01	20	9	107	1

	MAX. NUMBER LANE LOADS	LOAD REDUCTION FACTORS ACCORDING TO NUMBER OF LANES LOADED 1	2	3	4	5
05	4	1.000E+00	1.000E+00	9.000E-01	7.500E-01	

TABLE 3. LISTS OF STATIONS (NUMBER OF CARDS AS GIVEN IN TABLE 1. — NONE OR 14)

	LANES	STRS	SUPS	NUMBER OF MOMENT CONTROL POINTS	NUMBER OF SHEAR CONTROL POINTS
06	4	8	5	8	10

	STATION AT LEFT OF LANE	STATION AT RIGHT OF LANE	STATION AT STRINGERS (FRACTIONAL TENTHS OF INCREMENTS PERMITTED, F-FORMAT)	STATION AT SUPPORTS	STATION AT DESIGN CONTROL POINTS FOR MOMENT	STATION AT DESIGN CONTROL POINTS FOR SHEAR
07	9 38 66 95					
08		38 66 95 127				
09			13.3 29 44 59 74 89 104.5 119.7			
10			blank card			
11			blank card			
12				22 62 96 128 188		
13				blank card		
14					22 29 44 59 62 74 89 96	
15					blank card	
16					blank card	
17						20 24 31 50 57 64 76 87 94 98
18						blank card
19						blank card

File 5.29-1

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

BENT CAP PROGRAM (CONT'D)

TABLE 4 — STIFFNESS AND LOAD DATA (NUMBER OF CARDS AS GIVEN IN TABLE I. ALL DATA ADDED TO STORAGE)

PROBLEM NUMBER		FIXED OR MOVABLE: STATION FROM	STATION TO	CONTINUED IF=1	FIXED-POSITION DATA: BENDING-STIFFNESS OF CAP	SIDEWALK & SLAB LOADS	STRINGER & CAP LOADS	MOVABLE POSITION SLAB LOADS	REMARKS
40007	20	10	49		4.245E+06		-9.387E-01		Lt. Part of Lt. Cap
	21	49		1	4.245E+06		-9.387E-01		
	22		50	1	0.0 E+00		0.0 E+00		Hinge
	23		51		4.245E+06		-9.387E-01		
	24	51	108		4.245E+06		-9.387E-01		Rt. Part of Lt. Cap
	25	116	200		9.021E+06		-1.207E-00		Right Cap
	26	13	13				-3.280E+01		70% of 1st Bm
	27	14	14				-1.410		30% of 1st Bm
	28	29	29				-4.690		
	29	44	44						
	30	59	59						Interior Beam
	31	74	74						DL. Reactions
	32	89	89						
	33	104	104				-2.345		Beam @ 104.5
	34	105	105				-1.410		
	35	119	119				-3.280		Beam @ 119.7
	36	120	120				-4.690		
	37	132	132						
	38	148	148						Interior Beam
	39	164	164						DL. Reactions
	40	196	196				-3.750		Beam @ 196.2
	41	197	197				-9.400E+00		
	42	180	180				-4.690E+01		Interior Beam
	43	7	127			-4.409E+00			7¾" deck slab
	44	95	115			-3.414E+00			6" Median Slab
	45	4	4			-1.000E+01			Left Sign Support
	46	105	105			-4.410E+01			CMB reaction
	47	0	20					-8.674E+00	LL+I Reaction
	48								
	49								
	50								
	51								
	52								
	53								
	54								
	55								
	56								
	57								

Column numbers: 10 11 | 16 20 | 25 30 | 40 | 50 | 60 | 70

File 5.29-2

PROGRAM CAP 17 - DECK THD - MATLOCK,WBI,FE,JJP REVISION DATE # 12 JUN 68

PROB
40007 LKW EXAMPLE 5 SPECIAL CONDITIONS DEMONSTRATION JUNE 74
PART 1 - PART TO LEFT OF OPEN SLAB JOINT KIP FT UNITS

TABLE 1 -- PROGRAM-CONTROL DATA

	ENVELOPES OF MAXIMUMS	TABLE NUMBER 2	3	4
OPTIONS TO HOLD (IF=1) FROM PRECEDING PROB	0	0	0	0
NUMBER OF ADDITIONAL CARDS FOR CURRENT PROB		2	14	28
OPTION (IF=1) TO CLEAR ENVELOPES BEFORE LANE LOADINGS				0
OPTION (IF=1) TO PLOT DESIGN VARIABLE ENVELOPES				0
OPTION (IF=-1)TO OMIT OUTPUT TABLE 5				0
ANGLE OF SKEW, DEGREES				3.687E 01

TABLE 2 -- CONSTANTS

NUMBER OF INCREMENTS FOR SLAB AND CAP	207
INCREMENT LENGTH, FT	5.000E-01
NUMBER OF INCREMENTS FOR MOVABLE LOAD	20
INITIAL POSITION OF MOVABLE-LOAD STA ZERO	9
FINAL POSITION OF MOVABLE LOAD STA ZERO	107
NUMBER OF INCREMENTS BETWEEN EACH POSITION OF MOVABLE LOAD	1
MAXIMUM NUMBER OF LANES TO BE LOADED SIMULTANEOUSLY	4

LIST OF LOAD COEFFICIENTS CORRESPONDING TO NUMBER OF LANES LOADED

1	2	3	4	5
1.000E 00	1.000E 00	9.000E-01	7.500E-01	

TABLE 3 -- LISTS OF STATIONS

	NUM OF LANES	NUM OF STRINGERS	NUM OF SUPPORTS	NUM MOM CONTR PTS	NUM SHEAR CONTR PTS
TOTAL	4	8	5	8	10

	1	2	3	4	5	6	7	8	9	10
LANE LEFT	9	38	66	95						
LANE RIGHT	38	66	95	127						
STRINGERS	13.3	29.0	44.0	59.0	74.0	89.0	104.5	119.7		
SUPPORTS	22	62	96	128	188					
MOM CONTR	22	29	44	59	62	74	89	96		
SHEAR CONTR	20	24	31	50	57	64	76	87	94	98

TABLE 4 -- CAP STIFFNESS, AND DATA FOR BOTH FIXED AND MOVABLE LOADS

FIXED-OR-MOVABLE STA FROM	STA TO	CONTD IF=1	- - - - - FIXED-POSITION DATA - - - - - CAP BENDING STIFFNESS (K-FT*FT)	SIDEWALK, SLAB LOADS (K)	STRINGER, CAP LOADS (K)	MOVABLE-POSITION SLAB LOADS (K)
10	49	0	4.245E 06	0.0	-9.387E-01	0.0
49		1	4.245E 06	0.0	-9.387E-01	0.0
	50	1	0.0	0.0	0.0	0.0
	51	0	4.245E 06	0.0	-9.387E-01	0.0
51	108	0	4.245E 06	0.0	-9.387E-01	0.0
116	200	0	9.021E 06	0.0	-1.207E 00	0.0
13	13	0	0.0	0.0	-3.280E 01	0.0
14	14	0	0.0	0.0	-1.410E 01	0.0
29	29	0	0.0	0.0	-4.690E 01	0.0
44	44	0	0.0	0.0	-4.690E 01	0.0
59	59	0	0.0	0.0	-4.690E 01	0.0
74	74	0	0.0	0.0	-4.690E 01	0.0
89	89	0	0.0	0.0	-4.690E 01	0.0
104	104	0	0.0	0.0	-2.345E 01	0.0
105	105	0	0.0	0.0	-1.410E 01	0.0
119	119	0	0.0	0.0	-3.280E 01	0.0
120	120	0	0.0	0.0	-4.690E 01	0.0
132	132	0	0.0	0.0	-4.690E 01	0.0
148	148	0	0.0	0.0	-4.690E 01	0.0
164	164	0	0.0	0.0	-4.690E 01	0.0
196	196	0	0.0	0.0	-3.750E 01	0.0
197	197	0	0.0	0.0	-9.400E 00	0.0
180	180	0	0.0	0.0	-4.690E 01	0.0
7	127	0	0.0	-4.409E 00	0.0	0.0
95	115	0	0.0	-3.414E 00	0.0	0.0
4	4	0	0.0	-1.000E 01	0.0	0.0
105	105	0	0.0	-4.410E 01	0.0	0.0
0	20	0	0.0	0.0	0.0	-8.874E 00

TABLE 4A -- DEAD LOAD DEFLECTIONS

STA	DIST X (FT)	DEFLECTION (FT)
-1	-6.250E-01	0.0
0	0.0	0.0
1	6.250E-01	0.0
2	1.250E 00	0.0
3	1.875E 00	0.0
4	2.500E 00	0.0
5	3.125E 00	0.0
6	3.750E 00	0.0
7	4.375E 00	0.0
8	5.000E 00	0.0
9	5.625E 00	-1.353D-04
10	6.250E 00	-5.727D-05
11	6.875E 00	2.077D-05
12	7.500E 00	9.877D-05
13	8.125E 00	1.766D-04
14	8.750E 00	2.542D-04
15	9.375E 00	3.260D-04
16	1.000E 01	3.841D-04
17	1.063E 01	4.207D-04
18	1.125E 01	4.279D-04
19	1.188E 01	3.975D-04
20	1.250E 01	3.215D-04
21	1.313E 01	1.917D-04
22	1.375E 01	0.0
23	1.438E 01	-2.620D-04
24	1.500E 01	-5.851D-04
25	1.563E 01	-9.600D-04
26	1.625E 01	-1.378D-03
27	1.688E 01	-1.829D-03
28	1.750E 01	-2.305D-03
29	1.813E 01	-2.797D-03
30	1.875E 01	-3.295D-03
31	1.938E 01	-3.798D-03
32	2.000E 01	-4.302D-03
33	2.063E 01	-4.804D-03
34	2.125E 01	-5.302D-03
35	2.188E 01	-5.794D-03
36	2.250E 01	-6.276D-03
37	2.313E 01	-6.746D-03
38	2.375E 01	-7.203D-03
39	2.438E 01	-7.643D-03
40	2.500E 01	-8.064D-03
41	2.563E 01	-8.464D-03
42	2.625E 01	-8.842D-03
43	2.688E 01	-9.194D-03
44	2.750E 01	-9.520D-03
45	2.813E 01	-9.816D-03
46	2.875E 01	-1.009D-02
47	2.938E 01	-1.034D-02
48	3.000E 01	-1.058D-02
49	3.063E 01	-1.081D-02
50	3.125E 01	-1.103D-02
51	3.188E 01	-9.985D-03
52	3.250E 01	-8.946D-03
53	3.313E 01	-7.917D-03
54	3.375E 01	-6.903D-03
55	3.438E 01	-5.909D-03
56	3.500E 01	-4.941D-03
57	3.563E 01	-4.004D-03
58	3.625E 01	-3.103D-03
59	3.688E 01	-2.244D-03
60	3.750E 01	-1.433D-03
61	3.813E 01	-6.805D-04
62	3.875E 01	0.0
63	3.938E 01	5.967D-04
64	4.000E 01	1.116D-03
65	4.063E 01	1.564D-03
66	4.125E 01	1.948D-03
67	4.188E 01	2.273D-03
68	4.250E 01	2.546D-03
69	4.313E 01	2.772D-03
70	4.375E 01	2.959D-03
71	4.438E 01	3.111D-03
72	4.500E 01	3.236D-03
73	4.563E 01	3.337D-03
74	4.625E 01	3.422D-03
75	4.688E 01	3.496D-03
76	4.750E 01	3.559D-03
77	4.813E 01	3.608D-03
78	4.875E 01	3.644D-03
79	4.938E 01	3.665D-03
80	5.000E 01	3.671D-03
81	5.063E 01	3.659D-03
82	5.125E 01	3.628D-03
83	5.188E 01	3.578D-03
84	5.250E 01	3.507D-03
85	5.313E 01	3.413D-03
86	5.375E 01	3.295D-03
87	5.438E 01	3.151D-03
88	5.500E 01	2.980D-03
89	5.563E 01	2.780D-03
90	5.625E 01	2.548D-03
91	5.688E 01	2.277D-03
92	5.750E 01	1.957D-03
93	5.813E 01	1.578D-03
94	5.875E 01	1.132D-03
95	5.938E 01	6.089D-04
96	6.000E 01	0.0
97	6.063E 01	-7.044D-04
98	6.125E 01	-1.493D-03
99	6.188E 01	-2.354D-03
100	6.250E 01	-3.276D-03
101	6.313E 01	-4.249D-03
102	6.375E 01	-5.260D-03
103	6.438E 01	-6.299D-03
104	6.500E 01	-7.354D-03
105	6.563E 01	-8.416D-03
106	6.625E 01	-9.477D-03
107	6.688E 01	-1.054D-02
108	6.750E 01	-1.160D-02
109	6.813E 01	-1.266D-02
110	6.876E 01	0.0
111	6.938E 01	0.0
112	7.000E 01	0.0
113	7.063E 01	0.0
114	7.125E 01	0.0
115	7.188E 01	2.013D-04
116	7.250E 01	2.221D-04
117	7.313E 01	2.429D-04
118	7.375E 01	2.638D-04
119	7.438E 01	2.845D-04
120	7.500E 01	3.051D-04
121	7.563E 01	3.237D-04
122	7.625E 01	3.357D-04
123	7.688E 01	3.363D-04
124	7.750E 01	3.208D-04
125	7.813E 01	2.843D-04
126	7.875E 01	2.219D-04
127	7.938E 01	1.288D-04
128	8.000E 01	0.0
129	8.063E 01	-1.695D-04
130	8.125E 01	-3.754D-04
131	8.188E 01	-6.132D-04
132	8.250E 01	-8.788D-04
133	8.313E 01	-1.168D-03
134	8.375E 01	-1.477D-03
135	8.438E 01	-1.805D-03
136	8.500E 01	-2.147D-03
137	8.563E 01	-2.501D-03
138	8.625E 01	-2.864D-03
139	8.688E 01	-3.233D-03
140	8.750E 01	-3.607D-03
141	8.813E 01	-3.981D-03
142	8.875E 01	-4.354D-03
143	8.938E 01	-4.723D-03
144	9.000E 01	-5.086D-03
145	9.063E 01	-5.439D-03
146	9.125E 01	-5.781D-03
147	9.188E 01	-6.109D-03
148	9.250E 01	-6.421D-03
149	9.313E 01	-6.714D-03
150	9.375E 01	-6.987D-03
151	9.438E 01	-7.240D-03
152	9.500E 01	-7.472D-03
153	9.563E 01	-7.681D-03
154	9.625E 01	-7.866D-03
155	9.688E 01	-8.028D-03
156	9.750E 01	-8.165D-03
157	9.813E 01	-8.276D-03
158	9.875E 01	-8.361D-03
159	9.938E 01	-8.419D-03
160	1.000E 02	-8.450D-03
161	1.006E 02	-8.452D-03
162	1.013E 02	-8.426D-03
163	1.019E 02	-8.371D-03
164	1.025E 02	-8.287D-03
165	1.031E 02	-8.172D-03
166	1.038E 02	-8.029D-03
167	1.044E 02	-7.857D-03
168	1.050E 02	-7.659D-03
169	1.056E 02	-7.434D-03
170	1.063E 02	-7.184D-03
171	1.069E 02	-6.911D-03
172	1.075E 02	-6.615D-03
173	1.081E 02	-6.297D-03
174	1.088E 02	-5.960D-03
175	1.094E 02	-5.603D-03
176	1.100E 02	-5.228D-03
177	1.106E 02	-4.838D-03
178	1.113E 02	-4.432D-03
179	1.119E 02	-4.013D-03
180	1.125E 02	-3.582D-03
181	1.131E 02	-3.140D-03
182	1.138E 02	-2.691D-03
183	1.144E 02	-2.237D-03
184	1.150E 02	-1.782D-03
185	1.156E 02	-1.327D-03
186	1.163E 02	-8.764D-04
187	1.169E 02	-4.331D-04
188	1.175E 02	0.0
189	1.181E 02	4.198D-04
190	1.188E 02	8.279D-04
191	1.194E 02	1.226D-03
192	1.200E 02	1.616D-03
193	1.206E 02	1.999D-03
194	1.213E 02	2.378D-03
195	1.219E 02	2.752D-03
196	1.225E 02	3.125D-03
197	1.231E 02	3.497D-03
198	1.238E 02	3.869D-03
199	1.244E 02	4.241D-03
200	1.250E 02	4.613D-03
201	1.256E 02	4.985D-03
202	1.263E 02	0.0
203	1.269E 02	0.0
204	1.275E 02	0.0
205	1.281E 02	0.0
206	1.288E 02	0.0
207	1.294E 02	0.0
208	1.300E 02	0.0

This is four pages of output.

TABLE 5 -- MULTI-LANE LOADING SUMMARY (*--CRITICAL NUMBER OF LANE LOADS)

MOMENT (FT-K)

AT STA	DEAD LD EFFECT	LANE ORDER	POSITIVE MAXIMUM	LOAD AT LANE	LOAD AT STA	LANE ORDER	NEGATIVE MAXIMUM	LOAD AT LANE	LOAD AT STA
22	-7.639E 02								
		0	0.0			0	-6.147E 02	1	9
		1	0.0			1	-6.147E 02	1	9
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		4	0.0			4	0.0		
		0*				0*			
29	-7.483E 01								
		0	3.744E 02	0	24	0	-2.496E 02	1	9
		1	2.745E 02	1	18	1	-2.496E 02	1	9
		2	1.370E 02	2	38	2	0.0		
		3	0.0			3	0.0		
		4	0.0			4	0.0		
		2*				0*			
44	3.144E 02								
		0	3.816E 02	0	32	0	-7.131E 01	1	9
		1	3.307E 02	2	38	1	-7.131E 01	1	9
		2	1.426E 02	1	18	2	0.0		
		3	0.0			3	0.0		
		4	0.0			4	0.0		
		2*				0*			
59	-5.145E 02								
		0	1.070E 02	1	9	0	-5.724E 02	0	32
		1	1.070E 02	1	9	1	-4.961E 02	2	38
		2	0.0			2	-2.139E 02	1	18
		3	0.0			3	0.0		
		4	0.0			4	0.0		
		0*				2*			
62	-9.111E 02								
		0	1.426E 02	1	9	0	-8.082E 02	0	34
		1	1.426E 02	1	9	1	-7.701E 02	2	38
		2	0.0			2	-2.852E 02	1	18
		3	0.0			3	-3.550E 01	3	66
		4	0.0			4	0.0		
		0*				2*			
74	-1.188E 02								
		0	6.080E 02	3	67	0	-5.229E 02	0	34
		1	6.080E 02	3	67	1	-4.983E 02	2	38
		2	9.228E 01	1	9	2	-1.918E 02	4	97
		3	0.0			3	-1.846E 02	1	18
		4	0.0			4	0.0		
		2*				3*			
89	-3.367E 02								
		0	4.352E 02	3	73	0	-4.316E 02	4	97
		1	4.352E 02	3	73	1	-4.316E 02	4	97
		2	2.936E 01	1	9	2	-1.586E 02	2	38
		3	0.0			3	-5.872E 01	1	18
		4	0.0			4	0.0		
		2*				2*			
96	-1.038E 03								
		0	0.0			0	-6.345E 02	0	94
		1	0.0			1	-6.339E 02	4	95
		2	0.0			2	-5.475E 01	3	75
		3	0.0			3	0.0		
		4	0.0			4	0.0		
		0*				2*			

SHEAR (K)

AT STA	DEAD LD EFFECT	LANE ORDER	POSITIVE MAXIMUM	LOAD AT LANE	LOAD AT STA	LANE ORDER	NEGATIVE MAXIMUM	LOAD AT LANE	LOAD AT STA
20	-1.425E 02								
		0	0.0			0	-1.130E 02	1	9
		1	0.0			1	-1.130E 02	1	9
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		4	0.0			4	0.0		
		0*				0*			
24	1.593E 02								
		0	1.053E 02	1	18	0	0.0		
		1	1.053E 02	1	18	1	0.0		
		2	3.131E 01	2	38	2	0.0		
		3	0.0			3	0.0		
		4	0.0			4	0.0		
		2*				0*			
31	4.797E 01								
		0	2.066E 01	2	38	0	-1.492E 01	0	20
		1	2.066E 01	2	38	1	-1.407E 01	1	18
		2	1.902E 01	1	9	2	0.0		
		3	0.0			3	0.0		
		4	0.0			4	0.0		
		2*				0*			
50	-8.677E 01								
		0	1.902E 01	1	9	0	-1.018E 02	0	32
		1	1.902E 01	1	9	1	-8.819E 01	2	38
		2	0.0			2	-3.803E 01	1	18
		3	0.0			3	0.0		
		4	0.0			4	0.0		
		0*				2*			
57	-9.440E 01								
		0	1.902E 01	1	9	0	-1.018E 02	0	32
		1	1.902E 01	1	9	1	-8.819E 01	2	38
		2	0.0			2	-3.803E 01	1	18
		3	0.0			3	0.0		
		4	0.0			4	0.0		
		0*				2*			
64	1.103E 02								
		0	8.566E 01	0	65	0	-2.558E 01	4	97
		1	8.547E 01	3	66	1	-2.558E 01	4	97

		2	3.624E 01	2	38	2	-6.712E 00	1	9
		3	1.342E 01	1	18	3	0.0		
		4	0.0			4	0.0		
		2*				2*			
76	-1.678E 01								
		0	3.803E 01	0	34	0	-3.346E 01	0	63
		1	3.624E 01	2	38	1	-3.048E 01	3	66
		2	1.342E 01	1	18	2	-2.558E 01	4	97
		3	0.0			3	-6.711E 00	1	9
		4	0.0			4	0.0		
		2*				3*			
87	-2.969E 01								
		0	3.803E 01	0	34	0	-3.346E 01	0	63
		1	3.624E 01	2	38	1	-3.048E 01	3	66
		2	1.342E 01	1	18	2	-2.558E 01	4	97
		3	0.0			3	-6.711E 00	1	9
		4	0.0			4	0.0		
		2*				3*			
94	-1.620E 02								
		0	3.803E 01	0	34	0	-1.125E 02	0	78
		1	3.624E 01	2	38	1	-1.098E 02	3	75
		2	1.342E 01	1	18	2	-5.040E 01	4	95
		3	0.0			3	-6.712E 00	1	9
		4	0.0			4	0.0		
		2*				2*			
98	1.977E 02								
		0	1.194E 02	0	94	0	0.0		
		1	1.193E 02	4	95	1	0.0		
		2	1.031E 01	3	75	2	0.0		
		3	0.0			3	0.0		
		4	0.0			4	0.0		
		2*				0*			

REACTION (K) AT STA	DEAD LD EFFECT	LANE ORDER	POSITIVE MAXIMUM	LOAD AT LANE	STA	LANE ORDER	NEGATIVE MAXIMUM	LOAD AT LANE	STA
22	3.065E 02								
		0	1.965E 02	1	9	0	0.0		
		1	1.965E 02	1	9	1	0.0		
		2	3.131E 01	2	38	2	0.0		
		3	0.0			3	0.0		
		4	0.0			4	0.0		
		2*				0*			
62	3.260E 02								
		0	1.890E 02	2	42	0	-2.573E 01	1	9
		1	1.890E 02	2	42	1	-2.573E 01	1	9
		2	1.044E 02	3	66	2	-2.558E 01	4	97
		3	5.145E 01	1	18	3	0.0		
		4	0.0			4	0.0		
		3*				2*			
96	3.644E 02								
		0	1.833E 02	0	90	0	-3.803E 01	0	34
		1	1.697E 02	4	95	1	-3.624E 01	2	38
		2	1.201E 02	3	75	2	-1.342E 01	1	18
		3	6.711E 00	1	9	3	0.0		
		4	0.0			4	0.0		
		2*				2*			
128	3.473E 02								
		0	1.661E 02	4	107	0	0.0		
		1	1.661E 02	4	107	1	0.0		
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		4	0.0			4	0.0		
		0*				0*			
188	1.810E 02								
		0	0.0			0	-2.019E 01	4	107
		1	0.0			1	-2.019E 01	4	107
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		4	0.0			4	0.0		
		0*				0*			

TABLE 6 -- ENVELOPES OF MAXIMUM VALUES

STA	DIST X (FT)	MAX + MOM (FT-K)	MAX - MOM (FT-K)	MAX + SHEAR (K)	MAX - SHEAR (K)
-1	-6.250E-01	0.0	0.0	0.0	0.0
0	0.0	0.0	0.0	0.0	0.0
1	6.250E-01	0.0	0.0	0.0	0.0
2	1.250E 00	0.0	0.0	0.0	0.0
3	1.875E 00	0.0	0.0	0.0	0.0
4	2.500E 00	0.0	0.0	0.0	0.0
5	3.125E 00	0.0	0.0	0.0	0.0
6	3.750E 00	0.0	0.0	0.0	0.0
7	4.375E 00	0.0	0.0	0.0	0.0
8	5.000E 00	0.0	0.0	0.0	0.0
9	5.625E 00	0.0	0.0	7.541E-12	-1.013E-11
10	6.250E 00	9.426E-12	-1.267E-11	0.0	-2.933E-01
11	6.875E 00	0.0	-3.667E-01	0.0	-1.173E 00
12	7.500E 00	0.0	-1.467E 00	0.0	-2.347E 00
13	8.125E 00	0.0	-3.300E 00	0.0	-8.885E 01
14	8.750E 00	0.0	-1.125E 02	0.0	-2.119E 02
15	9.375E 00	0.0	-2.682E 02	0.0	-2.497E 02
16	1.000E 01	0.0	-4.246E 02	0.0	-2.509E 02
17	1.063E 01	0.0	-5.818E 02	0.0	-2.520E 02
18	1.125E 01	0.0	-7.397E 02	0.0	-2.532E 02
19	1.188E 01	0.0	-8.983E 02	0.0	-2.544E 02
20	1.250E 01	0.0	-1.058E 03	0.0	-2.556E 02
21	1.313E 01	0.0	-1.218E 03	0.0	-2.567E 02
22	1.375E 01	0.0	-1.379E 03	5.956E 01	-6.422E 00
23	1.438E 01	0.0	-1.226E 03	2.970E 02	0.0
24	1.500E 01	0.0	-1.074E 03	2.958E 02	0.0
25	1.563E 01	0.0	-9.224E 02	2.947E 02	0.0
26	1.625E 01	0.0	-7.718E 02	2.935E 02	0.0
27	1.688E 01	0.0	-6.219E 02	2.923E 02	0.0
28	1.750E 01	1.551E 02	-4.728E 02	2.911E 02	0.0
29	1.813E 01	3.367E 02	-3.244E 02	1.791E 02	0.0
30	1.875E 01	3.719E 02	-2.814E 02	8.882E 01	0.0
31	1.938E 01	4.064E 02	-2.392E 02	8.765E 01	0.0
32	2.000E 01	4.401E 02	-1.977E 02	8.648E 01	0.0
33	2.063E 01	4.731E 02	-1.569E 02	8.530E 01	0.0
34	2.125E 01	5.054E 02	-1.169E 02	8.413E 01	0.0
35	2.188E 01	5.369E 02	-7.761E 01	8.296E 01	0.0
36	2.250E 01	5.677E 02	-3.905E 01	8.178E 01	0.0
37	2.313E 01	5.978E 02	-1.214E 00	8.061E 01	0.0
38	2.375E 01	6.271E 02	0.0	7.944E 01	0.0
39	2.438E 01	6.557E 02	0.0	7.826E 01	0.0
40	2.500E 01	6.836E 02	0.0	7.709E 01	0.0
41	2.563E 01	7.107E 02	0.0	7.592E 01	0.0
42	2.625E 01	7.371E 02	0.0	7.474E 01	0.0
43	2.688E 01	7.628E 02	0.0	7.357E 01	0.0
44	2.750E 01	7.877E 02	0.0	0.0	-8.362E 01
45	2.813E 01	8.583E 02	0.0	0.0	-2.077E 02
46	2.875E 01	8.281E 02	0.0	0.0	-2.089E 02
47	2.938E 01	8.972E 02	0.0	0.0	-2.101E 02
48	3.000E 01	2.655E 02	0.0	0.0	-2.112E 02
49	3.063E 01	1.331E 02	0.0	0.0	-2.124E 02
50	3.125E 01	0.0	0.0	0.0	-2.130E 02
51	3.188E 01	0.0	-1.331E 02	0.0	-2.136E 02
52	3.250E 01	0.0	-2.670E 02	0.0	-2.148E 02
53	3.313E 01	0.0	-4.016E 02	0.0	-2.159E 02
54	3.375E 01	0.0	-5.369E 02	0.0	-2.171E 02
55	3.438E 01	0.0	-6.729E 02	0.0	-2.183E 02
56	3.500E 01	0.0	-8.097E 02	0.0	-2.194E 02
57	3.563E 01	0.0	-9.472E 02	0.0	-2.206E 02
58	3.625E 01	0.0	-1.086E 03	0.0	-2.218E 02
59	3.688E 01	0.0	-1.224E 03	0.0	-3.085E 02
60	3.750E 01	0.0	-1.471E 03	0.0	-4.027E 02
61	3.813E 01	0.0	-1.718E 03	0.0	-4.039E 02
62	3.875E 01	0.0	-1.967E 03	0.0	-1.224E 02
63	3.938E 01	0.0	-1.865E 03	2.332E 02	0.0
64	4.000E 01	0.0	-1.765E 03	2.320E 02	0.0
65	4.063E 01	0.0	-1.665E 03	2.309E 02	0.0
66	4.125E 01	0.0	-1.567E 03	2.297E 02	0.0
67	4.188E 01	0.0	-1.468E 03	2.285E 02	0.0
68	4.250E 01	0.0	-1.371E 03	2.274E 02	0.0
69	4.313E 01	2.046E 01	-1.291E 03	2.262E 02	0.0
70	4.375E 01	1.341E 02	-1.213E 03	2.250E 02	0.0
71	4.438E 01	2.470E 02	-1.135E 03	2.238E 02	0.0
72	4.500E 01	3.592E 02	-1.058E 03	2.227E 02	0.0
73	4.563E 01	4.707E 02	-9.816E 02	2.215E 02	0.0
74	4.625E 01	5.814E 02	-9.061E 02	1.073E 02	0.0
75	4.688E 01	5.501E 02	-9.019E 02	3.406E 01	-7.210E 01
76	4.750E 01	5.181E 02	-8.985E 02	3.288E 01	-7.328E 01
77	4.813E 01	4.854E 02	-8.958E 02	3.171E 01	-7.445E 01
78	4.875E 01	4.519E 02	-8.938E 02	3.054E 01	-7.562E 01
79	4.938E 01	4.177E 02	-8.926E 02	2.936E 01	-7.680E 01
80	5.000E 01	3.828E 02	-8.921E 02	2.819E 01	-7.797E 01
81	5.063E 01	3.471E 02	-8.923E 02	2.702E 01	-7.914E 01
82	5.125E 01	3.126E 02	-8.933E 02	2.584E 01	-8.032E 01
83	5.188E 01	2.884E 02	-8.950E 02	2.467E 01	-8.149E 01
84	5.250E 01	2.635E 02	-8.975E 02	2.350E 01	-8.266E 01
85	5.313E 01	2.378E 02	-9.006E 02	2.232E 01	-8.384E 01
86	5.375E 01	2.115E 02	-9.045E 02	2.115E 01	-8.501E 01
87	5.438E 01	1.843E 02	-9.092E 02	1.998E 01	-8.618E 01
88	5.500E 01	1.565E 02	-9.145E 02	1.880E 01	-8.736E 01
89	5.563E 01	1.279E 02	-9.268E 02	0.0	-1.867E 02
90	5.625E 01	0.0	-1.028E 03	0.0	-3.175E 02
91	5.688E 01	0.0	-1.130E 03	0.0	-3.187E 02
92	5.750E 01	0.0	-1.233E 03	0.0	-3.199E 02
93	5.813E 01	0.0	-1.337E 03	0.0	-3.210E 02
94	5.875E 01	0.0	-1.441E 03	0.0	-3.222E 02
95	5.938E 01	0.0	-1.546E 03	0.0	-3.234E 02
96	6.000E 01	0.0	-1.727E 03	7.343E 01	-3.575E 01
97	6.063E 01	0.0	-1.521E 03	3.285E 02	0.0
98	6.125E 01	0.0	-1.316E 03	3.273E 02	0.0
99	6.188E 01	0.0	-1.112E 03	3.262E 02	0.0
100	6.250E 01	0.0	-9.082E 02	3.250E 02	0.0
101	6.313E 01	0.0	-7.054E 02	3.238E 02	0.0
102	6.375E 01	0.0	-5.034E 02	3.226E 02	0.0
103	6.438E 01	0.0	-3.021E 02	3.215E 02	0.0
104	6.500E 01	0.0	-1.016E 02	2.391E 02	0.0
105	6.563E 01	0.0	-3.300E 00	8.008E 01	0.0
106	6.625E 01	0.0	-1.467E 00	2.347E 00	0.0
107	6.688E 01	0.0	-3.667E-01	1.173E 00	0.0
108	6.750E 01	9.426E-12	-4.713E-12	2.933E-01	0.0
109	6.813E 01	0.0	0.0	3.770E-12	-7.541E-12
110	6.875E 01	0.0	0.0	0.0	0.0
111	6.938E 01	0.0	0.0	0.0	0.0
112	7.000E 01	0.0	0.0	0.0	0.0
113	7.063E 01	0.0	0.0	0.0	0.0
114	7.125E 01	0.0	0.0	0.0	0.0
115	7.188E 01	0.0	0.0	1.703E-11	-1.002E-12
116	7.250E 01	2.128E-11	-1.252E-12	0.0	-3.772E-01
117	7.313E 01	0.0	-4.715E-01	0.0	-1.509E 00
118	7.375E 01	0.0	-1.886E 00	0.0	-3.017E 00

119	7.438E 01	0.0	-4.243E 00	0.0	-5.592E 01
120	7.500E 01	0.0	-7.178E 01	0.0	-2.139E 02
121	7.563E 01	0.0	-2.716E 02	0.0	-3.205E 02
122	7.625E 01	0.0	-4.724E 02	0.0	-3.220E 02
123	7.688E 01	0.0	-6.742E 02	0.0	-3.235E 02
124	7.750E 01	0.0	-8.768E 02	0.0	-3.250E 02
125	7.813E 01	0.0	-1.080E 03	0.0	-3.266E 02
126	7.875E 01	0.0	-1.285E 03	0.0	-3.281E 02
127	7.938E 01	0.0	-1.491E 03	0.0	-3.296E 02
128	8.000E 01	0.0	-1.697E 03	0.0	-7.436E 01
129	8.063E 01	0.0	-1.584E 03	1.808E 02	0.0
130	8.125E 01	0.0	-1.471E 03	1.793E 02	0.0
131	8.188E 01	0.0	-1.359E 03	1.778E 02	0.0
132	8.250E 01	0.0	-1.249E 03	1.529E 02	0.0
133	8.313E 01	0.0	-1.168E 03	1.279E 02	0.0
134	8.375E 01	0.0	-1.089E 03	1.264E 02	0.0
135	8.438E 01	0.0	-1.010E 03	1.249E 02	0.0
136	8.500E 01	0.0	-9.327E 02	1.234E 02	0.0
137	8.563E 01	0.0	-8.560E 02	1.219E 02	0.0
138	8.625E 01	0.0	-7.803E 02	1.204E 02	0.0
139	8.688E 01	0.0	-7.056E 02	1.189E 02	0.0
140	8.750E 01	0.0	-6.318E 02	1.173E 02	0.0
141	8.813E 01	3.418E 01	-5.589E 02	1.158E 02	0.0
142	8.875E 01	9.349E 01	-4.870E 02	1.143E 02	0.0
143	8.938E 01	1.519E 02	-4.160E 02	1.128E 02	0.0
144	9.000E 01	2.093E 02	-3.460E 02	1.113E 02	0.0
145	9.063E 01	2.657E 02	-2.769E 02	1.098E 02	0.0
146	9.125E 01	3.213E 02	-2.087E 02	1.083E 02	0.0
147	9.188E 01	3.759E 02	-1.415E 02	1.068E 02	0.0
148	9.250E 01	4.295E 02	-7.523E 01	8.182E 01	0.0
149	9.313E 01	4.529E 02	-3.922E 01	5.686E 01	0.0
150	9.375E 01	4.754E 02	-4.152E 00	5.536E 01	0.0
151	9.438E 01	4.969E 02	0.0	5.385E 01	0.0
152	9.500E 01	5.174E 02	0.0	5.234E 01	0.0
153	9.563E 01	5.371E 02	0.0	5.083E 01	0.0
154	9.625E 01	5.557E 02	0.0	4.932E 01	0.0
155	9.688E 01	5.735E 02	0.0	4.781E 01	0.0
156	9.750E 01	5.903E 02	0.0	4.630E 01	0.0
157	9.813E 01	6.061E 02	0.0	4.479E 01	0.0
158	9.875E 01	6.210E 02	0.0	4.329E 01	0.0
159	9.938E 01	6.350E 02	0.0	4.178E 01	0.0
160	1.000E 02	6.480E 02	0.0	4.027E 01	0.0
161	1.006E 02	6.601E 02	0.0	3.876E 01	0.0
162	1.013E 02	6.712E 02	0.0	3.725E 01	0.0
163	1.019E 02	6.814E 02	0.0	3.574E 01	0.0
164	1.025E 02	6.907E 02	0.0	1.078E 01	-9.407E 00
165	1.031E 02	6.697E 02	0.0	0.0	-3.437E 01
166	1.038E 02	6.477E 02	0.0	0.0	-3.587E 01
167	1.044E 02	6.248E 02	0.0	0.0	-3.738E 01
168	1.050E 02	6.010E 02	0.0	0.0	-3.889E 01
169	1.056E 02	5.762E 02	0.0	0.0	-4.040E 01
170	1.063E 02	5.505E 02	0.0	0.0	-4.191E 01
171	1.069E 02	5.238E 02	0.0	0.0	-4.342E 01
172	1.075E 02	4.962E 02	0.0	0.0	-4.493E 01
173	1.081E 02	4.676E 02	0.0	0.0	-4.644E 01
174	1.088E 02	4.382E 02	0.0	0.0	-4.794E 01
175	1.094E 02	4.077E 02	0.0	0.0	-4.945E 01
176	1.100E 02	3.763E 02	0.0	0.0	-5.096E 01
177	1.106E 02	3.440E 02	0.0	0.0	-5.247E 01
178	1.113E 02	3.107E 02	0.0	0.0	-5.398E 01
179	1.119E 02	2.765E 02	0.0	0.0	-5.549E 01
180	1.125E 02	2.414E 02	0.0	0.0	-8.045E 01
181	1.131E 02	1.760E 02	0.0	0.0	-1.054E 02
182	1.138E 02	1.096E 02	0.0	0.0	-1.069E 02
183	1.144E 02	4.234E 01	-2.075E 01	0.0	-1.084E 02
184	1.150E 02	0.0	-7.637E 01	0.0	-1.099E 02
185	1.156E 02	0.0	-1.329E 02	0.0	-1.114E 02
186	1.163E 02	0.0	-1.904E 02	0.0	-1.129E 02
187	1.169E 02	0.0	-2.489E 02	0.0	-1.145E 02
188	1.175E 02	0.0	-3.083E 02	0.0	-2.548E 01
189	1.181E 02	0.0	-2.681E 02	6.350E 01	0.0
190	1.188E 02	0.0	-2.289E 02	6.199E 01	0.0
191	1.194E 02	0.0	-1.906E 02	6.048E 01	0.0
192	1.200E 02	0.0	-1.533E 02	5.897E 01	0.0
193	1.206E 02	0.0	-1.169E 02	5.746E 01	0.0
194	1.213E 02	0.0	-8.147E 01	5.595E 01	0.0
195	1.219E 02	0.0	-4.697E 01	5.444E 01	0.0
196	1.225E 02	0.0	-1.342E 01	3.418E 01	0.0
197	1.231E 02	0.0	-4.243E 00	9.226E 00	0.0
198	1.238E 02	0.0	-1.886E 00	3.017E 00	0.0
199	1.244E 02	0.0	-4.715E-01	1.509E 00	0.0
200	1.250E 02	3.130E-12	-2.003E-11	3.772E-01	0.0
201	1.256E 02	0.0	0.0	1.602E-11	-2.504E-12
202	1.263E 02	0.0	0.0	0.0	0.0
203	1.269E 02	0.0	0.0	0.0	0.0
204	1.275E 02	0.0	0.0	0.0	0.0
205	1.281E 02	0.0	0.0	0.0	0.0
206	1.288E 02	0.0	0.0	0.0	0.0
207	1.294E 02	0.0	0.0	0.0	0.0
208	1.300E 02	0.0	0.0	0.0	0.0

TABLE 7 -- MAXIMUM SUPPORT REACTIONS

STA	DIST X FT	MAX + REACT K	MAX - REACT K
22	1.375E 01	5.343E 02	0.0
62	3.875E 01	6.363E 02	0.0
96	6.000E 01	6.542E 02	0.0
128	8.000E 01	5.134E 02	0.0
188	1.175E 02	1.810E 02	0.0

TABLE 8 -- SCALES FOR PLOT OUTPUT

NO PLOTS SPECIFIED FOR PROBLEM, 40007

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

BENT CAP PROGRAM

SHEET 2 OF 2 BY LKW
DATE _____ CONTROL _____
DISTRICT _____ IPE _____
COUNTY _____ PROB. NO 40008

IDENTIFICATION OF PROBLEM (2 CARDS EACH PROB.)

PROB. NO.	DISTRICT	INITIALS	DESCRIPTION OF PROBLEM (LETTERS AND/OR NUMBERS & ALLOWABLE SYMBOLS)
40008 01		LKW	EXAMPLE 5 PART 2 JUNE 74
02	IPE		NOTE USE ONLY THESE SYMBOLS + - . , ( ) / * $ = PART 2 - PART TO RIGHT OF OPEN SLAB JOINT KIP FT UNITS

TABLE 1. PROGRAM-CONTROL DATA (1 CARD EACH PROBLEM)

ENTER "1" TO HOLD FROM PRECEDING PROBLEM	ENVELOPES	NO OF CARDS IN THIS PROBLEM TABLE 2	TABLE 3	TABLE 4	ENTER "1" TO CLEAR ENVELOPES OF MAXIMUM VALUES PRIOR TO MULTI-LANE LOADING	ENTER "1" TO PLOT ENVELOPES	ENTER (-1) TO ELIMINATE TABLE 5 ON OUTPUT LISTING	SKEW ANGLE
03	1	2	14	6		1		3.687E+01

TABLE 2. CONSTANTS (2 CARDS UNLESS DATA HELD FROM PRECEDING PROBLEM)

	NUMBER OF INCREMENTS	INCREMENT LENGTH	MOVABLE-LOAD DATA: NUMBER OF INCREMENTS	START STATION	STOP STATION	MOVABLE LOAD INCREMENT
04	207	5.000E-01	20	127	201	1

	MAX NUMBER LANE LOADS	LOAD REDUCTION FACTORS ACCORDING TO NUMBER OF LANES LOADED 1	2	3	4	5
05	3	1.000E+00	1.000E+00	9.000E-01		

TABLE 3. LISTS OF STATIONS (NUMBER OF CARDS AS GIVEN IN TABLE 1. — NONE OR 14)

	LANES	STRS	SUPS	NUMBER OF MOMENT CONTROL POINTS	NUMBER OF SHEAR CONTROL POINTS
06	3	5	5	6	6

	STATION AT LEFT OF LANE									
07	127	152	176							

	STATION AT RIGHT OF LANE									
08	152	176	201							

	STATION AT STRINGERS (FRACTIONAL TENTHS OF INCREMENTS PERMITTED, F-FORMAT)									
09	132	148	164	180	196.2					
10	blank card									
11	blank card									

	STATION AT SUPPORTS									
12	22	62	96	126	188					
13	blank card									

	STATION AT DESIGN CONTROL POINTS FOR MOMENT									
14	128	132	148	164	180	188				
15	blank card									
16	blank card									

	STATION AT DESIGN CONTROL POINTS FOR SHEAR									
17	130	150	162	166	178	186				
18	blank card									
19	blank card									

06

File 3.29-1

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

BENT CAP PROGRAM (CONT'D)

TABLE 4 — STIFFNESS AND LOAD DATA (NUMBER OF CARDS AS GIVEN IN TABLE I. ALL DATA ADDED TO STORAGE)

PROBLEM NUMBER	FIXED OR MOVABLE	FIXED STATION FROM	FIXED STATION TO	CONTINUED IF=1	FIXED-POSITION DATA: BENDING-STIFFNESS OF CAP	FIXED-POSITION DATA: SIDEWALK & SLAB LOADS	FIXED-POSITION DATA: STRINGER & CAP LOADS	MOVABLE POSITION SLAB LOADS	REMARKS
40008		7	112			+4.409E+00			Cancel 7¾" Slab
		95	115			+3.414E+00			do. Median
		4	4			+1.000E+01			do. Lt. Sign Support
		105	105			+4.410E+01			do. CMP
		127	203			-4.552E+00			Add 8" Slab
		206	206			-1.000E+01			Add Rt. Sign Support

Card columns: 5–9 (Problem Number); 10–11 (Fixed or Movable); 16–20 (Fixed Station From); 21–25 (Fixed Station To); 30 (Continued If=1); 31–40 (Bending-Stiffness of Cap); 41–50 (Sidewalk & Slab Loads); 51–60 (Stringer & Cap Loads); 61–70 (Movable Position Slab Loads); 71–80 (Remarks).

File 5.29-2

PROGRAM CAP 17 - DECK THD - MATLOCK,WBI,FE,JJP REVISION DATE # 12 JUN 68

PROB
40008 LKW EXAMPLE 5 PART 2 JUNE 74
PART 2 - PART TO RIGHT OF OPEN SLAB JOINT KIP FT UNITS

TABLE 1 -- PROGRAM-CONTROL DATA

	ENVELOPES OF MAXIMUMS	TABLE NUMBER 2	3	4
OPTIONS TO HOLD (IF=1) FROM PRECEDING PROB	1	0	0	1
NUMBER OF ADDITIONAL CARDS FOR CURRENT PROB		2	14	6
OPTION (IF=1) TO CLEAR ENVELOPES BEFORE LANE LOADINGS				0
OPTION (IF=1) TO PLOT DESIGN VARIABLE ENVELOPES				1
OPTION (IF=-1)TO OMIT OUTPUT TABLE 5				0
ANGLE OF SKEW, DEGREES				3.687E 01

TABLE 2 -- CONSTANTS

NUMBER OF INCREMENTS FOR SLAB AND CAP	207
INCREMENT LENGTH, FT	5.000E-01
NUMBER OF INCREMENTS FOR MOVABLE LOAD	20
INITIAL POSITION OF MOVABLE-LOAD STA ZERO	127
FINAL POSITION OF MOVABLE LOAD STA ZERO	201
NUMBER OF INCREMENTS BETWEEN EACH POSITION OF MOVABLE LOAD	1
MAXIMUM NUMBER OF LANES TO BE LOADED SIMULTANEOUSLY	3

LIST OF LOAD COEFFICIENTS CORRESPONDING TO NUMBER OF LANES LOADED

1	2	3	4	5
1.000E 00	1.000E 00	9.000E-01		

TABLE 3 -- LISTS OF STATIONS

	NUM OF LANES	NUM OF STRINGERS	NUM OF SUPPORTS	NUM MOM CONTR PTS	NUM SHEAR CONTR PTS
TOTAL	3	5	5	6	6

	1	2	3	4	5	6	7	8	9	10
LANE LEFT	127	152	176							
LANE RIGHT	152	176	201							
STRINGERS	132.0	148.0	164.0	180.0	196.2					
SUPPORTS	22	62	96	128	188					
MOM CONTR	128	132	148	164	180	188				
SHEAR CONTR	130	150	162	166	178	186				

TABLE 4 -- CAP STIFFNESS, AND DATA FOR BOTH FIXED AND MOVABLE LOADS

USING DATA FROM THE PREVIOUS PROBLEM PLUS

FIXED-OR-MOVABLE STA FROM	STA TO	CONTD IF=1	FIXED-POSITION DATA CAP BENDING STIFFNESS (K-FT*FT)	SIDEWALK, SLAB LOADS (K)	STRINGER, CAP LOADS (K)	MOVABLE-POSITION SLAB LOADS (K)
7	112	0	0.0	4.409E 00	0.0	0.0
95	115	0	0.0	3.414E 00	0.0	0.0
4	4	0	0.0	1.000E 01	0.0	0.0
105	105	0	0.0	4.410E 01	0.0	0.0
127	203	0	0.0	-4.552E 00	0.0	0.0
206	206	0	0.0	-1.000E 01	0.0	0.0

TABLE 4A -- DEAD LOAD DEFLECTIONS

STA	DIST X (FT)	DEFLECTION (FT)
-1	-6.250E-01	0.0
0	0.0	0.0
1	6.250E-01	0.0
2	1.250E 00	0.0
3	1.875E 00	0.0
4	2.500E 00	0.0
5	3.125E 00	0.0
6	3.750E 00	0.0
7	4.375E 00	0.0
8	5.000E 00	0.0
9	5.625E 00	7.119D-04
10	6.250E 00	6.842D-04
11	6.875E 00	6.566D-04
12	7.500E 00	6.289D-04
13	8.125E 00	6.010D-04
14	8.750E 00	5.729D-04
15	9.375E 00	5.424D-04
16	1.000E 01	5.064D-04
17	1.063E 01	4.619D-04
18	1.125E 01	4.058D-04
19	1.188E 01	3.349D-04
20	1.250E 01	2.458D-04
21	1.313E 01	1.353D-04
22	1.375E 01	0.0
23	1.438E 01	-1.637D-04
24	1.500E 01	-3.511D-04
25	1.563E 01	-5.579D-04
26	1.625E 01	-7.797D-04
27	1.688E 01	-1.012D-03
28	1.750E 01	-1.251D-03
29	1.813E 01	-1.492D-03
30	1.875E 01	-1.731D-03
31	1.938E 01	-1.967D-03
32	2.000E 01	-2.198D-03
33	2.063E 01	-2.423D-03
34	2.125E 01	-2.642D-03
35	2.188E 01	-2.852D-03
36	2.250E 01	-3.054D-03
37	2.313E 01	-3.245D-03
38	2.375E 01	-3.426D-03
39	2.438E 01	-3.595D-03
40	2.500E 01	-3.751D-03
41	2.563E 01	-3.895D-03
42	2.625E 01	-4.024D-03
43	2.688E 01	-4.140D-03
44	2.750E 01	-4.240D-03
45	2.813E 01	-4.326D-03
46	2.875E 01	-4.398D-03
47	2.938E 01	-4.461D-03
48	3.000E 01	-4.515D-03
49	3.063E 01	-4.564D-03
50	3.125E 01	-4.611D-03
51	3.188E 01	-4.658D-03
52	3.250E 01	-3.707D-03
53	3.313E 01	-3.262D-03
54	3.375E 01	-2.825D-03
55	3.438E 01	-2.399D-03
56	3.500E 01	-1.987D-03
57	3.563E 01	-1.593D-03
58	3.625E 01	-1.219D-03
59	3.688E 01	-8.681D-04
60	3.750E 01	-5.441D-04
61	3.813E 01	-2.527D-04
62	3.875E 01	0.0
63	3.938E 01	2.078D-04
64	4.000E 01	3.748D-04
65	4.063E 01	5.050D-04
66	4.125E 01	6.023D-04
67	4.188E 01	6.705D-04
68	4.250E 01	7.136D-04
69	4.313E 01	7.350D-04
70	4.375E 01	7.387D-04
71	4.438E 01	7.280D-04
72	4.500E 01	7.066D-04
73	4.563E 01	6.779D-04
74	4.625E 01	6.452D-04
75	4.688E 01	6.119D-04
76	4.750E 01	5.786D-04
77	4.813E 01	5.457D-04
78	4.875E 01	5.136D-04
79	4.938E 01	4.827D-04
80	5.000E 01	4.533D-04
81	5.063E 01	4.256D-04
82	5.125E 01	3.997D-04
83	5.188E 01	3.757D-04
84	5.250E 01	3.536D-04
85	5.313E 01	3.334D-04
86	5.375E 01	3.150D-04
87	5.438E 01	2.981D-04
88	5.500E 01	2.825D-04
89	5.563E 01	2.679D-04
90	5.625E 01	2.538D-04
91	5.688E 01	2.372D-04
92	5.750E 01	2.147D-04
93	5.813E 01	1.832D-04
94	5.875E 01	1.392D-04
95	5.938E 01	7.928D-05
96	6.000E 01	0.0
97	6.063E 01	-1.022D-04
98	6.125E 01	-2.245D-04
99	6.188E 01	-3.638D-04
100	6.250E 01	-5.176D-04
101	6.313E 01	-6.829D-04
102	6.375E 01	-8.571D-04
103	6.438E 01	-1.038D-03
104	6.500E 01	-1.222D-03
105	6.563E 01	-1.408D-03
106	6.625E 01	-1.594D-03
107	6.688E 01	-1.780D-03
108	6.750E 01	-1.967D-03
109	6.813E 01	-2.153D-03
110	6.875E 01	0.0
111	6.938E 01	0.0
112	7.000E 01	0.0
113	7.063E 01	0.0
114	7.125E 01	0.0
115	7.188E 01	1.634D-02
116	7.250E 01	1.510D-02
117	7.313E 01	1.386D-02
118	7.375E 01	1.263D-02
119	7.438E 01	1.139D-02
120	7.500E 01	1.015D-02
121	7.563E 01	8.910D-03
122	7.625E 01	7.668D-03
123	7.688E 01	6.419D-03
124	7.750E 01	5.162D-03
125	7.813E 01	3.894D-03
126	7.875E 01	2.613D-03
127	7.938E 01	1.316D-03
128	8.000E 01	0.0
129	8.063E 01	-1.337D-03
130	8.125E 01	-2.685D-03
131	8.188E 01	-4.035D-03
132	8.250E 01	-5.377D-03
133	8.313E 01	-6.703D-03
134	8.375E 01	-8.008D-03
135	8.438E 01	-9.290D-03
136	8.500E 01	-1.054D-02
137	8.563E 01	-1.177D-02
138	8.625E 01	-1.296D-02
139	8.688E 01	-1.412D-02
140	8.750E 01	-1.523D-02
141	8.813E 01	-1.631D-02
142	8.875E 01	-1.734D-02
143	8.938E 01	-1.832D-02
144	9.000E 01	-1.925D-02
145	9.063E 01	-2.013D-02
146	9.125E 01	-2.095D-02
147	9.188E 01	-2.171D-02
148	9.250E 01	-2.241D-02
149	9.313E 01	-2.305D-02
150	9.375E 01	-2.362D-02
151	9.438E 01	-2.412D-02
152	9.500E 01	-2.456D-02
153	9.563E 01	-2.493D-02
154	9.625E 01	-2.523D-02
155	9.688E 01	-2.546D-02
156	9.750E 01	-2.562D-02
157	9.813E 01	-2.571D-02
158	9.875E 01	-2.573D-02
159	9.938E 01	-2.568D-02
160	1.000E 02	-2.555D-02
161	1.006E 02	-2.536D-02
162	1.013E 02	-2.509D-02
163	1.019E 02	-2.475D-02
164	1.025E 02	-2.433D-02
165	1.031E 02	-2.385D-02
166	1.038E 02	-2.329D-02
167	1.044E 02	-2.266D-02
168	1.050E 02	-2.197D-02
169	1.056E 02	-2.122D-02
170	1.063E 02	-2.041D-02
171	1.069E 02	-1.954D-02
172	1.075E 02	-1.863D-02
173	1.081E 02	-1.766D-02
174	1.088E 02	-1.665D-02
175	1.094E 02	-1.560D-02
176	1.100E 02	-1.451D-02
177	1.106E 02	-1.338D-02
178	1.113E 02	-1.223D-02
179	1.119E 02	-1.104D-02
180	1.125E 02	-9.837D-03
181	1.131E 02	-8.609D-03
182	1.138E 02	-7.367D-03
183	1.144E 02	-6.118D-03
184	1.150E 02	-4.869D-03
185	1.156E 02	-3.625D-03
186	1.163E 02	-2.395D-03
187	1.169E 02	-1.184D-03
188	1.175E 02	0.0
189	1.181E 02	1.151D-03
190	1.188E 02	2.272D-03
191	1.194E 02	3.369D-03
192	1.200E 02	4.445D-03
193	1.206E 02	5.503D-03
194	1.213E 02	6.549D-03
195	1.219E 02	7.586D-03
196	1.225E 02	8.618D-03
197	1.231E 02	9.649D-03
198	1.238E 02	1.068D-02
199	1.244E 02	1.171D-02
200	1.250E 02	1.274D-02
201	1.256E 02	1.377D-02
202	1.263E 02	0.0
203	1.269E 02	0.0
204	1.275E 02	0.0
205	1.281E 02	0.0
206	1.288E 02	0.0
207	1.294E 02	0.0
208	1.300E 02	0.0

This is four pages of output.

PROB (CONTD)
40008 LKW EXAMPLE 5 PART 2 JUNE 74
PART 2 - PART TO RIGHT OF OPEN SLAB JOINT KIP FT UNITS

TABLE 5 -- MULTI-LANE LOADING SUMMARY (*--CRITICAL NUMBER OF LANE LOADS)

MOMENT (FT-K)

AT STA	DEAD LD EFFECT	LANE ORDER	POSITIVE MAXIMUM	LOAD AT LANE	STA	LANE ORDER	NEGATIVE MAXIMUM	LOAD AT LANE	STA
128	-4.869E 02								
		0	0.0			0	0.0		
		1	0.0			1	0.0		
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		0*				0*			
132	3.936E 02								
		0	3.771E 02	1	127	0	-7.025E 01	0	188
		1	3.771E 02	1	127	1	-2.219E 01	3	181
		2	1.923E 02	2	152	2	0.0		
		3	1.479E 01	3	176	3	0.0		
		2*				0*			
148	1.490E 03								
		0	1.232E 03	0	141	0	-3.513E 02	0	188
		1	9.909E 02	1	132	1	-1.109E 02	3	181
		2	9.614E 02	2	152	2	0.0		
		3	7.395E 01	3	176	3	0.0		
		2*				0*			
164	1.700E 03								
		0	1.331E 03	2	152	0	-6.323E 02	0	188
		1	1.331E 03	2	152	1	-1.997E 02	3	181
		2	6.212E 02	1	132	2	0.0		
		3	1.331E 02	3	176	3	0.0		
		2*				0*			
180	4.716E 02								
		0	6.406E 02	0	163	0	-9.133E 02	0	188
		1	5.620E 02	2	156	1	-2.884E 02	3	181
		2	2.871E 02	1	132	2	0.0		
		3	1.479E 02	3	176	3	0.0		
		3*				0*			
188	-7.714E 02								
		0	0.0			0	-9.713E 02	0	188
		1	0.0			1	-6.176E 02	3	181
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		0*				0*			

SHEAR (K)

AT STA	DEAD LD EFFECT	LANE ORDER	POSITIVE MAXIMUM	LOAD AT LANE	STA	LANE ORDER	NEGATIVE MAXIMUM	LOAD AT LANE	STA
130	3.522E 02								
		0	1.509E 02	1	127	0	-2.810E 01	0	188
		1	1.509E 02	1	127	1	-8.874E 00	3	181
		2	7.691E 01	2	152	2	0.0		
		3	5.916E 00	3	176	3	0.0		
		2*				0*			
150	3.006E 01								
		0	4.927E 01	0	159	0	-3.744E 01	0	133
		1	4.733E 01	2	156	1	-3.697E 01	1	132
		2	5.916E 00	3	176	2	-8.874E 00	3	181
		3	0.0			3	0.0		
		2*				2*			
162	1.196E 01								
		0	4.927E 01	0	159	0	-3.744E 01	0	133
		1	4.733E 01	2	156	1	-3.697E 01	1	132
		2	5.916E 00	3	176	2	-8.874E 00	3	181
		3	0.0			3	0.0		
		2*				2*			
166	-1.138E 02								
		0	1.941E 00	0	175	0	-8.477E 01	0	149
		1	1.479E 00	3	176	1	-8.282E 01	2	152
		2	0.0			2	-4.141E 01	1	132
		3	0.0			3	-8.874E 00	3	181
		0*				2*			
178	-1.319E 02								
		0	1.941E 00	0	175	0	-8.477E 01	0	149
		1	1.479E 00	3	176	1	-8.282E 01	2	152
		2	0.0			2	-4.141E 01	1	132
		3	0.0			3	-8.874E 00	3	181
		0*				2*			
186	-2.516E 02								
		0	1.360E 01	0	199	0	-1.322E 02	0	165
		1	0.0			1	-1.124E 02	2	156
		2	0.0			2	-1.014E 02	3	176
		3	0.0			3	-4.141E 01	1	132
		0*				3*			

REACTION (K)

AT STA	DEAD LD EFFECT	LANE ORDER	POSITIVE MAXIMUM	LOAD AT LANE	STA	LANE ORDER	NEGATIVE MAXIMUM	LOAD AT LANE	STA
22	1.402E 02								
		0	0.0			0	0.0		
		1	0.0			1	0.0		
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		0*				0*			
62	1.784E 02								
		0	0.0			0	0.0		
		1	0.0			1	0.0		
		2	0.0			2	0.0		
		3	0.0			3	0.0		
		0*				0*			
96	1.142E 02								
		0	0.0			0	0.0		
		1	0.0			1	0.0		
		2	0.0			2	0.0		
		3	0.0			3	0.0		

		0*				0*			
128	4.530E 02								
		0	1.509E 02	1	127	0	-2.810E 01	0	188
		1	1.509E 02	1	127	1	-8.874E 00	3	181
		2	7.691E 01	2	152	2	0.0		
		3	5.916E 00	3	176	3	0.0		
		2*				0*			
188	4.100E 02								
		0	2.041E 02	0	187	0	0.0		
		1	1.864E 02	3	181	1	0.0		
		2	1.124E 02	2	156	2	0.0		
		3	4.141E 01	1	132	3	0.0		
		3*				0*			

TABLE 6 -- ENVELOPES OF MAXIMUM VALUES

STA	DIST X (FT)	MAX + MOM (FT-K)	MAX - MOM (FT-K)	MAX + SHEAR (K)	MAX - SHEAR (K)
-1	-6.250E-01	0.0	0.0	0.0	0.0
0	0.0	0.0	0.0	0.0	0.0
1	6.250E-01	0.0	0.0	0.0	0.0
2	1.250E 00	0.0	0.0	0.0	0.0
3	1.875E 00	0.0	0.0	0.0	0.0
4	2.500E 00	0.0	0.0	0.0	0.0
5	3.125E 00	0.0	0.0	0.0	0.0
6	3.750E 00	0.0	0.0	0.0	0.0
7	4.375E 00	0.0	0.0	0.0	0.0
8	5.000E 00	0.0	0.0	0.0	0.0
9	5.625E 00	0.0	0.0	7.541E-12	-1.013E-11
10	6.250E 00	9.426E-12	-1.267E-11	0.0	-2.933E-01
11	6.875E 00	0.0	-3.667E-01	0.0	-1.173E 00
12	7.500E 00	0.0	-1.467E 00	0.0	-2.347E 00
13	8.125E 00	0.0	-3.300E 00	0.0	-8.885E 01
14	8.750E 00	0.0	-1.125E 02	0.0	-2.119E 02
15	9.375E 00	0.0	-2.682E 02	0.0	-2.497E 02
16	1.000E 01	0.0	-4.246E 02	0.0	-2.509E 02
17	1.063E 01	0.0	-5.818E 02	0.0	-2.520E 02
18	1.125E 01	0.0	-7.397E 02	0.0	-2.532E 02
19	1.188E 01	0.0	-8.983E 02	0.0	-2.544E 02
20	1.250E 01	0.0	-1.058E 03	0.0	-2.556E 02
21	1.313E 01	0.0	-1.218E 03	0.0	-2.567E 02
22	1.375E 01	0.0	-1.379E 03	5.956E 01	-6.422E 00
23	1.438E 01	0.0	-1.226E 03	2.970E 02	0.0
24	1.500E 01	0.0	-1.074E 03	2.958E 02	0.0
25	1.563E 01	0.0	-9.224E 02	2.947E 02	0.0
26	1.625E 01	0.0	-7.718E 02	2.935E 02	0.0
27	1.688E 01	0.0	-6.219E 02	2.923E 02	0.0
28	1.750E 01	1.551E 02	-4.728E 02	2.911E 02	0.0
29	1.813E 01	3.367E 02	-3.244E 02	1.791E 02	0.0
30	1.875E 01	3.719E 02	-2.814E 02	8.882E 01	0.0
31	1.938E 01	4.064E 02	-2.392E 02	8.765E 01	0.0
32	2.000E 01	4.401E 02	-1.977E 02	8.648E 01	0.0
33	2.063E 01	4.731E 02	-1.569E 02	8.530E 01	0.0
34	2.125E 01	5.054E 02	-1.169E 02	8.413E 01	0.0
35	2.188E 01	5.369E 02	-7.761E 01	8.296E 01	0.0
36	2.250E 01	5.677E 02	-3.905E 01	8.178E 01	0.0
37	2.313E 01	5.978E 02	-1.214E 00	8.061E 01	0.0
38	2.375E 01	6.271E 02	0.0	7.944E 01	0.0
39	2.438E 01	6.557E 02	0.0	7.826E 01	0.0
40	2.500E 01	6.836E 02	0.0	7.709E 01	0.0
41	2.563E 01	7.107E 02	0.0	7.592E 01	0.0
42	2.625E 01	7.371E 02	0.0	7.474E 01	0.0
43	2.688E 01	7.628E 02	0.0	7.357E 01	0.0
44	2.750E 01	7.877E 02	0.0	0.0	-8.362E 01
45	2.813E 01	6.583E 02	0.0	0.0	-2.077E 02
46	2.875E 01	5.281E 02	0.0	0.0	-2.089E 02
47	2.938E 01	3.972E 02	0.0	0.0	-2.101E 02
48	3.000E 01	2.655E 02	0.0	0.0	-2.112E 02
49	3.063E 01	1.331E 02	0.0	0.0	-2.124E 02
50	3.125E 01	0.0	0.0	0.0	-2.130E 02
51	3.188E 01	0.0	-1.331E 02	0.0	-2.136E 02
52	3.250E 01	0.0	-2.670E 02	0.0	-2.148E 02
53	3.313E 01	0.0	-4.016E 02	0.0	-2.159E 02
54	3.375E 01	0.0	-5.369E 02	0.0	-2.171E 02
55	3.438E 01	0.0	-6.729E 02	0.0	-2.183E 02

Hinge, zero moment. → STA 50

56	3.500E 01	0.0	-8.097E 02	0.0	-2.194E 02
57	3.563E 01	0.0	-9.472E 02	0.0	-2.206E 02
58	3.625E 01	0.0	-1.086E 03	0.0	-2.218E 02
59	3.688E 01	0.0	-1.224E 03	0.0	-3.085E 02
60	3.750E 01	0.0	-1.471E 03	0.0	-4.027E 02
61	3.813E 01	0.0	-1.718E 03	0.0	-4.039E 02
62	3.875E 01	0.0	-1.967E 03	0.0	-1.224E 02
63	3.938E 01	0.0	-1.865E 03	2.332E 02	0.0
64	4.000E 01	0.0	-1.765E 03	2.320E 02	0.0
65	4.063E 01	0.0	-1.665E 03	2.309E 02	0.0
66	4.125E 01	0.0	-1.567E 03	2.297E 02	0.0
67	4.188E 01	0.0	-1.468E 03	2.285E 02	0.0
68	4.250E 01	0.0	-1.371E 03	2.274E 02	0.0
69	4.313E 01	2.046E 01	-1.291E 03	2.262E 02	0.0
70	4.375E 01	1.341E 02	-1.213E 03	2.250E 02	0.0
71	4.438E 01	2.470E 02	-1.135E 03	2.238E 02	0.0
72	4.500E 01	3.592E 02	-1.058E 03	2.227E 02	0.0
73	4.563E 01	4.707E 02	-9.816E 02	2.215E 02	0.0
74	4.625E 01	5.814E 02	-9.061E 02	1.073E 02	0.0
75	4.688E 01	5.501E 02	-9.019E 02	3.406E 01	-7.210E 01
76	4.750E 01	5.181E 02	-8.985E 02	3.288E 01	-7.328E 01
77	4.813E 01	4.854E 02	-8.958E 02	3.171E 01	-7.445E 01
78	4.875E 01	4.519E 02	-8.938E 02	3.054E 01	-7.562E 01
79	4.938E 01	4.177E 02	-8.926E 02	2.936E 01	-7.680E 01
80	5.000E 01	3.828E 02	-8.921E 02	2.819E 01	-7.797E 01
81	5.063E 01	3.471E 02	-8.923E 02	2.702E 01	-7.914E 01
82	5.125E 01	3.126E 02	-8.933E 02	2.584E 01	-8.032E 01
83	5.188E 01	2.884E 02	-8.950E 02	2.467E 01	-8.149E 01
84	5.250E 01	2.635E 02	-8.975E 02	2.350E 01	-8.266E 01
85	5.313E 01	2.378E 02	-9.006E 02	2.232E 01	-8.384E 01
86	5.375E 01	2.115E 02	-9.045E 02	2.115E 01	-8.501E 01
87	5.438E 01	1.843E 02	-9.092E 02	1.998E 01	-8.618E 01
88	5.500E 01	1.565E 02	-9.145E 02	1.880E 01	-8.736E 01
89	5.563E 01	1.279E 02	-9.268E 02	0.0	-1.867E 02
90	5.625E 01	0.0	-1.028E 03	0.0	-3.175E 02
91	5.688E 01	0.0	-1.130E 03	0.0	-3.187E 02
92	5.750E 01	0.0	-1.233E 03	0.0	-3.199E 02
93	5.813E 01	0.0	-1.337E 03	0.0	-3.210E 02
94	5.875E 01	0.0	-1.441E 03	0.0	-3.222E 02
95	5.938E 01	0.0	-1.546E 03	0.0	-3.234E 02
96	6.000E 01	0.0	-1.727E 03	7.343E 01	-3.575E 01
97	6.063E 01	0.0	-1.521E 03	3.285E 02	0.0
98	6.125E 01	0.0	-1.316E 03	3.273E 02	0.0
99	6.188E 01	0.0	-1.112E 03	3.262E 02	0.0
100	6.250E 01	0.0	-9.082E 02	3.250E 02	0.0
101	6.313E 01	0.0	-7.054E 02	3.238E 02	0.0
102	6.375E 01	0.0	-5.034E 02	3.226E 02	0.0
103	6.438E 01	0.0	-3.021E 02	3.215E 02	0.0
104	6.500E 01	0.0	-1.016E 02	2.391E 02	0.0
105	6.563E 01	0.0	-3.300E 00	8.008E 01	0.0
106	6.625E 01	0.0	-1.467E 00	2.347E 00	0.0
107	6.688E 01	0.0	-3.667E-01	1.173E 00	0.0
108	6.750E 01	9.426E-12	-4.713E-12	2.933E-01	0.0
109	6.813E 01	0.0	0.0	3.770E-12	-7.541E-12
110	6.875E 01	0.0	0.0	0.0	0.0
111	6.938E 01	0.0	0.0	0.0	0.0
112	7.000E 01	0.0	0.0	0.0	0.0
113	7.063E 01	0.0	0.0	0.0	0.0
114	7.125E 01	0.0	0.0	0.0	0.0
115	7.188E 01	0.0	0.0	1.703E-11	-1.122E-10
116	7.250E 01	2.128E-11	-1.402E-10	0.0	-3.772E-01
117	7.313E 01	0.0	-4.715E-01	0.0	-1.509E 00
118	7.375E 01	0.0	-1.886E 00	0.0	-3.017E 00

End of Left Cap

Beginning of Right Cap

119	7.438E 01	0.0	-4.243E 00	0.0	-5.592E 01
120	7.500E 01	0.0	-7.178E 01	0.0	-2.139E 02
121	7.563E 01	0.0	-2.716E 02	0.0	-3.205E 02
122	7.625E 01	0.0	-4.724E 02	0.0	-3.220E 02
123	7.688E 01	0.0	-6.742E 02	0.0	-3.235E 02
124	7.750E 01	0.0	-8.768E 02	0.0	-3.250E 02
125	7.813E 01	0.0	-1.080E 03	0.0	-3.266E 02
126	7.875E 01	0.0	-1.285E 03	0.0	-3.281E 02
127	7.938E 01	0.0	-1.491E 03	0.0	-3.296E 02
128	8.000E 01	0.0	-1.697E 03	2.426E 02	-7.436E 01
129	8.063E 01	0.0	-1.584E 03	5.815E 02	0.0
130	8.125E 01	2.399E 02	-1.471E 03	5.799E 02	0.0
131	8.188E 01	6.019E 02	-1.359E 03	5.784E 02	0.0
132	8.250E 01	9.630E 02	-1.249E 03	4.129E 02	0.0
133	8.313E 01	1.105E 03	-1.168E 03	2.622E 02	0.0
134	8.375E 01	1.254E 03	-1.089E 03	2.607E 02	0.0
135	8.438E 01	1.416E 03	-1.010E 03	2.592E 02	0.0
136	8.500E 01	1.578E 03	-9.327E 02	2.577E 02	0.0
137	8.563E 01	1.738E 03	-8.560E 02	2.562E 02	0.0
138	8.625E 01	1.898E 03	-7.803E 02	2.547E 02	0.0
139	8.688E 01	2.057E 03	-7.056E 02	2.532E 02	0.0
140	8.750E 01	2.214E 03	-6.318E 02	2.516E 02	0.0
141	8.813E 01	2.371E 03	-5.589E 02	2.501E 02	0.0
142	8.875E 01	2.527E 03	-4.870E 02	2.486E 02	0.0
143	8.938E 01	2.682E 03	-4.160E 02	2.471E 02	0.0
144	9.000E 01	2.836E 03	-3.460E 02	2.456E 02	0.0
145	9.063E 01	2.989E 03	-2.769E 02	2.441E 02	0.0
146	9.125E 01	3.141E 03	-2.087E 02	2.426E 02	0.0
147	9.188E 01	3.292E 03	-1.415E 02	2.411E 02	0.0
148	9.250E 01	3.442E 03	-7.523E 01	1.363E 02	0.0
149	9.313E 01	3.463E 03	-3.922E 01	8.482E 01	-1.428E 01
150	9.375E 01	3.482E 03	-4.152E 00	8.331E 01	-1.579E 01
151	9.438E 01	3.500E 03	0.0	8.180E 01	-1.729E 01
152	9.500E 01	3.518E 03	0.0	8.029E 01	-1.880E 01
153	9.563E 01	3.534E 03	0.0	7.878E 01	-2.031E 01
154	9.625E 01	3.549E 03	0.0	7.727E 01	-2.182E 01
155	9.688E 01	3.564E 03	0.0	7.576E 01	-2.333E 01
156	9.750E 01	3.578E 03	0.0	7.425E 01	-2.484E 01
157	9.813E 01	3.590E 03	0.0	7.275E 01	-2.635E 01
158	9.875E 01	3.602E 03	0.0	7.124E 01	-2.786E 01
159	9.938E 01	3.613E 03	0.0	6.973E 01	-2.937E 01
160	1.000E 02	3.623E 03	0.0	6.822E 01	-3.087E 01
161	1.006E 02	3.632E 03	0.0	6.671E 01	-3.238E 01
162	1.013E 02	3.639E 03	0.0	6.520E 01	-3.389E 01
163	1.019E 02	3.646E 03	0.0	6.369E 01	-3.540E 01
164	1.025E 02	3.653E 03	0.0	1.078E 01	-1.130E 02
165	1.031E 02	3.505E 03	0.0	0.0	-2.365E 02
166	1.038E 02	3.357E 03	0.0	0.0	-2.380E 02
167	1.044E 02	3.208E 03	0.0	0.0	-2.396E 02
168	1.050E 02	3.057E 03	0.0	0.0	-2.411E 02
169	1.056E 02	2.906E 03	0.0	0.0	-2.426E 02
170	1.063E 02	2.754E 03	0.0	0.0	-2.441E 02
171	1.069E 02	2.601E 03	0.0	0.0	-2.456E 02
172	1.075E 02	2.447E 03	0.0	0.0	-2.471E 02
173	1.081E 02	2.307E 03	0.0	0.0	-2.486E 02
174	1.088E 02	2.165E 03	0.0	0.0	-2.501E 02
175	1.094E 02	2.023E 03	0.0	0.0	-2.516E 02
176	1.100E 02	1.880E 03	-4.162E 01	0.0	-2.531E 02
177	1.106E 02	1.735E 03	-1.402E 02	0.0	-2.546E 02
178	1.113E 02	1.590E 03	-2.398E 02	0.0	-2.561E 02
179	1.119E 02	1.444E 03	-3.402E 02	0.0	-2.577E 02
180	1.125E 02	1.297E 03	-4.417E 02	0.0	-3.542E 02
181	1.131E 02	1.001E 03	-6.010E 02	0.0	-4.738E 02

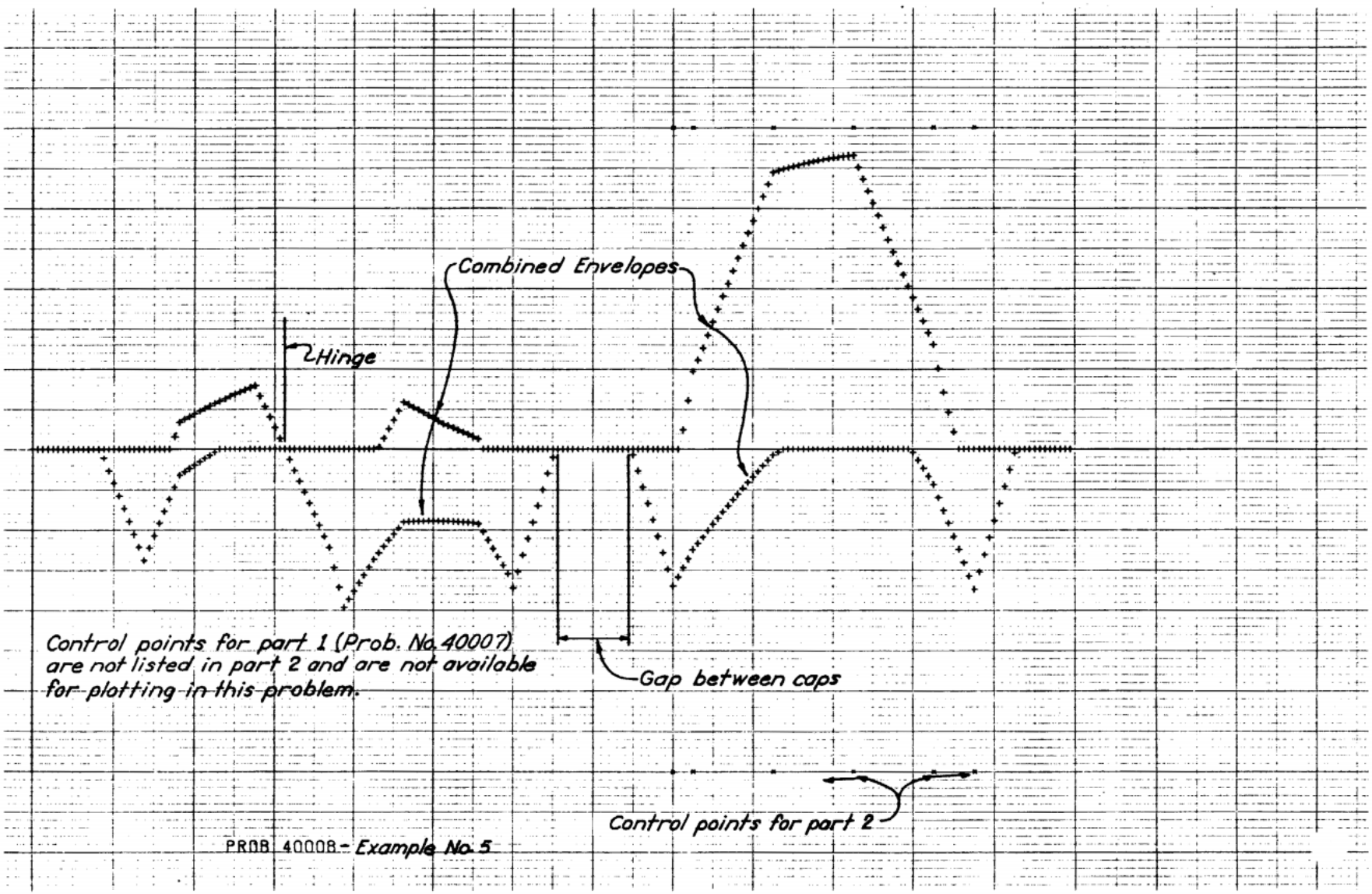
182	1.138E 02	7.046E 02	-7.613E 02	0.0	-4.753E 02
183	1.144E 02	4.563E 02	-9.225E 02	0.0	-4.768E 02
184	1.150E 02	2.126E 02	-1.085E 03	0.0	-4.783E 02
185	1.156E 02	0.0	-1.248E 03	0.0	-4.799E 02
186	1.163E 02	0.0	-1.412E 03	0.0	-4.814E 02
187	1.169E 02	0.0	-1.577E 03	0.0	-4.829E 02
188	1.175E 02	0.0	-1.743E 03	3.933E 01	-1.330E 02
189	1.181E 02	0.0	-1.528E 03	3.434E 02	0.0
190	1.188E 02	0.0	-1.314E 03	3.419E 02	0.0
191	1.194E 02	0.0	-1.100E 03	3.404E 02	0.0
192	1.200E 02	0.0	-8.880E 02	3.389E 02	0.0
193	1.206E 02	0.0	-6.767E 02	3.374E 02	0.0
194	1.213E 02	0.0	-4.663E 02	3.359E 02	0.0
195	1.219E 02	0.0	-2.569E 02	3.343E 02	0.0
196	1.225E 02	0.0	-4.841E 01	2.021E 02	0.0
197	1.231E 02	0.0	-4.243E 00	3.722E 01	0.0
198	1.238E 02	0.0	-1.886E 00	3.017E 00	0.0
199	1.244E 02	0.0	-4.715E-01	1.509E 00	0.0
200	1.250E 02	1.202E-10	-2.003E-11	3.772E-01	0.0
201	1.256E 02	0.0	0.0	1.602E-11	-9.615E-11
202	1.263E 02	0.0	0.0	0.0	0.0
203	1.269E 02	0.0	0.0	0.0	0.0
204	1.275E 02	0.0	0.0	0.0	0.0
205	1.281E 02	0.0	0.0	0.0	0.0
206	1.288E 02	0.0	0.0	0.0	0.0
207	1.294E 02	0.0	0.0	0.0	0.0
208	1.300E 02	0.0	0.0	0.0	0.0

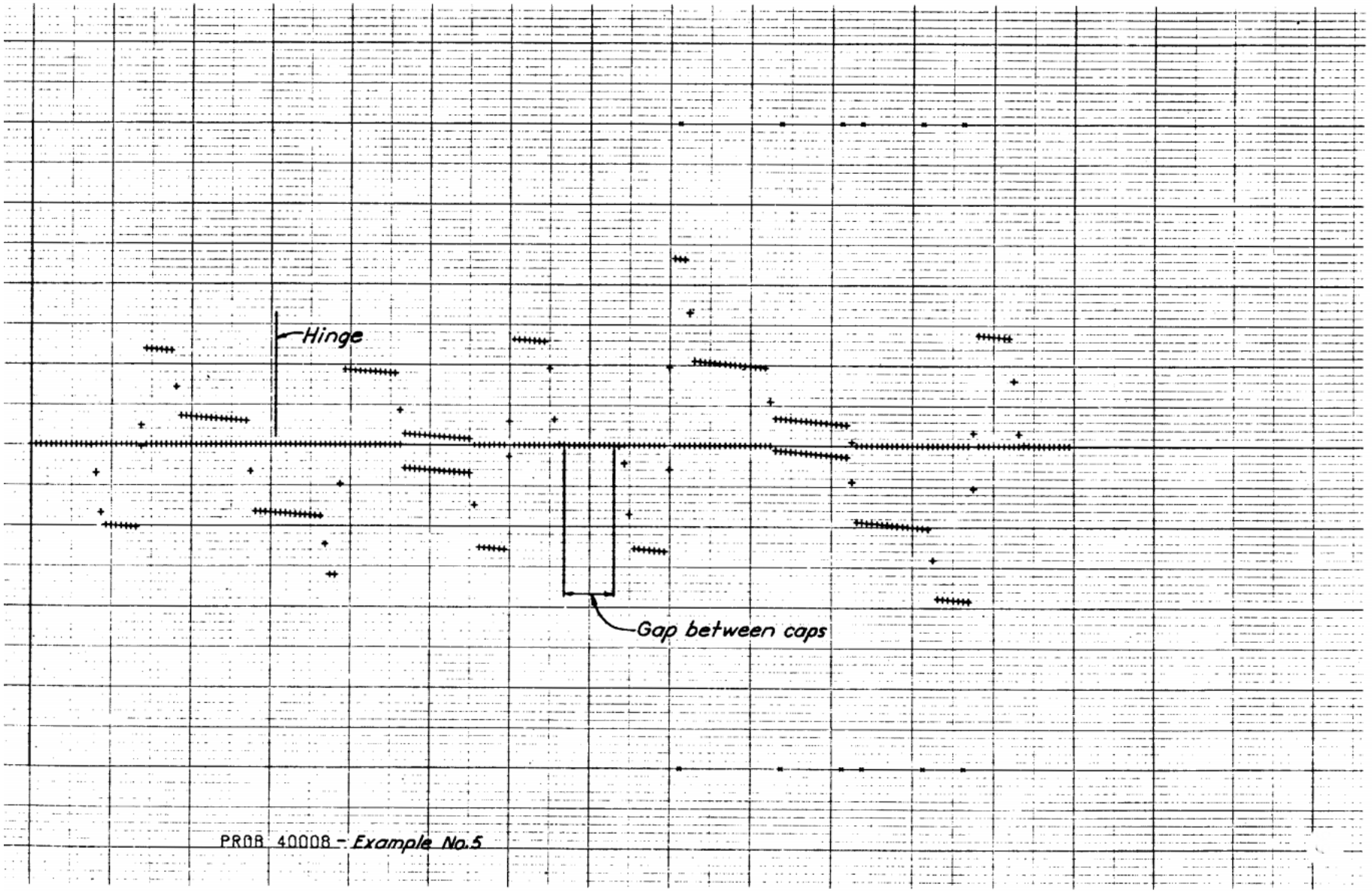
TABLE 7 -- MAXIMUM SUPPORT REACTIONS

STA	DIST X FT	MAX + REACT K	MAX - REACT K
22	1.375E 01	5.343E 02	0.0
62	3.875E 01	6.363E 02	0.0
96	6.000E 01	6.542E 02	0.0
128	8.000E 01	6.808E 02	0.0
188	1.175E 02	7.162E 02	0.0

TABLE 8 -- SCALES FOR PLOT OUTPUT

DISTANCE	20. INCHES =	200.	FT
MOMENT	4. INCHES =	4000.	FT-K
SHEAR	4. INCHES =	1000.	K


Combined Envelopes
Hinge
Control points for part 1 (Prob. No. 40007)
are not listed in part 2 and are not available
for plotting in this problem.
Gap between caps
Control points for part 2
PROB 40008 - Example No. 5



PROB 40008 – *Example No.5*

REFERENCE

1. Matlock., Hudson, and W. B. Ingram, “A Computer Program to Analyze Bending of Bent Caps,” Research Report No. 56-2, Center for Highway Research., The University of Texas at Austin, October 1966.